HELSINKI SCHOOL OF ECONOMICS
Department of Economics

WOMEN'S STATUS AND CHILDREN'S WELFARE IN NEPAL

Master's Thesis in Econonomics
Milla Nyyssölä
Fall Term 2007

Approved by the Head of the Economics Department 14/1 2008 and awarded the grade excellent, (90 p).

Tarkastajat:
prof. Pertti Haaparanta ja
prof. Pekka Ilmakunnas

HELSINGIN KAUPPAKORKEAKOULU
Kansantaloustiede, pro gradu-tutkielma
Milla Nyyssölä

TIIVISTELMÄ

30.11.2007

NAISTEN PERHEENSISÄINEN ASEMA JA LASTEN HYVINVOINTI NEPALISSA

Tutkielman tavoitteena on tarkastella naisen perheensisäisen aseman vaikutuksia lasten hyvinvointiin Nepalissa. Työ pyrkii osoittamaan, että perinteisen unitaarimallin (Becker, 1981) sijasta kotitalouksia tulisi lähestyä käyttäen niin sanottua kollektiivimallia (Chiappori ym., 1993). Tällöin oletuksena on, että jäsen jolla on perheessä suurin neuvotteluvoima, vaikuttaa voimakkaimmin sen päätöksentekoon. Lisäksi kotitalouden investoinnit ovat riippuvaisia päätöksentekijän henkilökohtaisista preferensseistä. Aiempi tutkimus on osoittanut että äidit neuvottelevat isiä herkemmin lasten hyvinvoinnin puolesta (esim. Duflo, 2005). Tässä työssä naisen perheensisäistä asemaa, on mitattu joukolla avainmuuttujia. Työ koostuu kahdesta toisiaan täydentävästä esseestä, jotka tarkastelevat naisen neuvotteluvoiman indikaattoreiden implikaatioita yhtäältä lasten ruokaturvan toteutumisen antropometrisin indikaattorein ja toisaalta lapsityön esiintymisen todennäköisyyteen. Tutkimusaineisto koostuu kahdesta Maailmanpankin ja Nepalin tilastokeskuksen (CBS) kokoamasta kotitalousdatasta *Nepal Living Standards Survey* (NLSS) 1 ja 2. Molemmat analyysit osoittavat, että naisen neuvotteluvoiman indikaattoreilla on vaikutusta lasten hyvinvointiin. Lisäksi tuloksissa on selkeästi nähtävissä tyttölasten poikia huonompi asema.

Ensimmäinen essee pyrkii osoittamaan että perheissä, joiden päätöksentekoprosessissa äidillä on sanavaltaa, alle 4-vuotiaat lapset kasvavat painavammiksi ja pidemmiksi ikäänsä nähden sekä painavammiksi pituuteensa nähden. Tätä suhdetta on estimoitu lineaarisella mallilla, jossa selitettävinä muuttujina ovat lapsen ruokaturvaa mittaavaa normaalikasvun indikaattorit ja selittäjinä naisen voiman indikaattorit sekä muut keskeiset muuttujat, jotka vaikuttavat lapsen normaaliin kehitykseen. Tutkimuksen ekonometrinen analyysi perustuu Nepalin kotitalousdataan (NLSS 1) ajanjaksolta 1994/1995. Tulokset osoittavat että erityisesti äidin kyky päättää omasta hedelmällisyydestään, naimaikä sekä vanhempien välinen koulutusero vaikuttavat lasten ruokaturvaan.

Toinen essee pyrkii osoittamaan että kouluikäiset lapset käyvät pienemmällä todennäköisyydellä töissä ja suuremmalla todennäköisyydellä koulussa perheissä, joissa äidillä on valtaa perheen päätösprosessissa verrattuna tilanteeseen, jossa isä on ainoa vallanpitäjä. Tätä on estimoitu Nepalin kotitalousaineistosta 2003/2004 (NLSS 2) kahden riippuvan muuttujan probit-mallilla. Nämä muuttujat ovat 5-14-vuotiaiden lasten koulussa - sekä työssäkäynti. Tulokset indikoivat että lapset lähetetään töihin pienemmällä todennäköisyydellä perheissä, joissa äidillä on merkittävämpi neuvotteluvoima erityisesti mitattuna äidin työn ulkopuolisilla tuloilla (tulonsiirrot), naimaiällä ja kyvyllä päättää omasta hedelmällisyydestään. Tyttölasten huono asema näkyy myös tuloksissa; kun koulutuksen suhteellinen kustannus nousee tytöt lopettavat koulunkäynnin poikia aiemmin.

Avainsanat: Naisten perheensisäinen asema, gender, antropometriset mittarit, lapsityö, koulunkäynti, Nepal, Aasia

HELSINKI SCHOOL OF ECONOMICS
Economics, Master's thesis
Milla Nyyssölä

SUMMARY

30 November 2007

WOMEN'S STATUS AND CHILDREN'S WELFARE IN NEPAL

This master's thesis examines women's intra-family status and its implications on children's welfare in Nepal. The thesis aims to contribute to the literature with two interrelated studies, which investigate the effect of women's intra-family status indicators on children's food security and child labour. This is done by using the Nepal Living Standards Survey (NLSS) data conducted by the World Bank and the Nepal Central Bureau of Statistics. This study attempts to find evidence for a collective approach of the household (e.g. Chiappori et al. 1993) against the traditional unitary model (Becker, 1981). The principal assumption is that the intra-family decisions are most influenced by the member with the bargaining power and that the household expenditures differ depending on the decision-maker. Previous research has shown (e.g. Duflo, 2005) that the mothers negotiate for children's welfare more than the fathers. A woman's intra-family status relative to her husband, which generally is low in Nepal, is measured with a set of key status indicators. Both econometric analyses find evidence that women's status indicators affect children's welfare in Nepal. The boy preference in Nepal is visible in both studies.

The first study attempts to find evidence from the NLSS 1 (1995/1996) data to whether under 4-year-old children are heavier for their age, taller for their age or heavier for their height in families, where the mother has decisive power in the intra-family bargaining process. The relationship between mother's intra-family status and these three anthropometric indicators is analyzed with a linear model, where on the left hand side are children's anthropometric z-scores and on the right hand side women's status indicators and other factors affecting children's food security. The results show that especially the intra-family status indicators; mother's awareness of fertility controlling, her age at childbirth and the inter-spousal education gap, have an impact on children's growth.

The second essay aims to find evidence to whether children are less likely to work and more likely to attend school in a household, where the mother has a say in the intra-family decision-making, than in one where the father holds all the power. This is done using a bivariate probit model with two dependent variables: child labour and school attendance from the NLSS 2 data (2003/2004). The results support the hypothesis that in households where mothers have bargaining power, measured in particular with mother's non-labour income (remittances), mother's marriage age and her awareness of fertility controlling, children are less likely sent to work. The analysis shows as well that in a situation where the relative cost of schooling rises, girls are the first ones to stay home.

Keywords: Women's intra-family status, gender, children's anthropometric z-scores, child labour, schooling, Nepal, Asia

TABLE OF CONTENTS

List of tables: Essay 1

List of tables: Essay 2

Preface[1]

Nepal is one of the few countries in the world where the proportion of men is higher than that of women. The natural gender ratio is severely distorted, which is due to profound inequalities between men and women. In the late 1980's Amartya Sen coined a term *Missing Women* to describe this dismal phenomenon prevalent in South Asia. Yet, in developing countries mothers are in a fundamental role in raising the next generation of adults to fight against hunger. There is a growing body of evidence concerning the gains that special programs targeted to women are generating. One of the most renowned programs is the Nobel price winning Grameen Bank (effects studied in e.g. Yunus, 1998). Another influential program examining the women's impact on children and poverty is the PROGRESA in Mexico (examined e.g. in Quisumbing et al., 2000).

This study attempts to create a wider picture of women's status implications on children's welfare with two separate essays[2]. The aim in both studies is to find evidence for the collective model (e.g. in Chiappori et al. 1993) of the household against the traditional unitary model, which views the household as having only one set of preferences (Becker, 1981). The collective model assumes that the members may have different preferences. Moreover, all members possess specific bargaining powers that affect the intra-household decision-making. It has been argued that bargaining power in the hands of women leads to a greater wellbeing of the children than in the hands of men, since women possess different preferences than men (e.g. Duflo, 2005).

The hunger strikes the children the first. Their situation in Nepal is pitiable measured with infant mortality rates, the prevalence of malnutrition, child labour and low school participation rates. Improving the status of women has an effect on these phenomena. The cure for infant mortality is in improving women's health and their abilities to take care of the children, since they are directly dependent of the mother. The importance of the mother's status does not cease even later, since according to Basu (2004) children will be less likely sent to work in a household where power is evenly distributed than in one where all the power in the hands of either parent.

The variables chosen for measuring women's intra-family status in both essays have received significant evidence for their performance as bargaining power indicators. These

[1] ***Acknowledgements:*** I am grateful to Basudeb Guha-Khasnobis for making these two studies part of the 'Gender and Food Security' Project at UNU-WIDER. I would like to thank Professors Pertti Haaparanta and Pekka Ilmakunnas at Economics Department in the Helsinki School of Economics and Rafael de Hoyos in the World Bank for their valuable advice.

[2] The essays are published as UNU-WIDER working papers in the "Gender and Food Security" project.

status factors can be classified to those that are expected to convey information of a woman's status relative to her husband such as differences in ages, education attainments, work burdens, labour and non-labour incomes. And to those that improve a woman's expected bargaining power within the household such as marriage age, ability to control fertility and mobility. The other essential variables in the models can be classified to child, parent, household, ethnicity and regional levels. In Nepal the gender bias against females begins from the very birth. Thus this thesis takes a look also on the differences mother's status generates depending on the gender of the child. Both studies indicate that the mother's status affects children differently depending on the gender.

The first essay under the topic "Women's Status and Food Security in Nepal" examines the implications of women's intra-family status on very young children's food security measured with anthropometric z-scores of growth upon data from the Nepal Living Standards Survey 1 (1994/1995). This study goes through in a greater detail the Nepalese context and the conceptual linkages between the mother and the child. The relation between children's growth indicators and women's status and other essential variables is studied with OLS estimation. The results indicate that especially the mother's marriage age, her awareness of fertility controlling and the inter-spousal education gap affect children's growth.

The second essay "Women's Status and Child Labour in Nepal" examines the impact of women's intra-family status on the likelihood of child labour and school attendance. It utilises a similar set of explanatory status variables as the first essay, but the essential explanatory variables are parallel to child labour research. The relationship is modelled with a bivariate probit analysis from the Nepal Living Standards Survey 2 (2003/2004). The analysis shows that the mother's marriage age, awareness of birth controlling methods and her remittances affect child labour and children's school attendance.

References

Basu, K. 2004: *Gender and Say.* Harvard Institute of Economic Research, Discussion Paper Number 2054.

Becker, G. 1981: *A Treatise on the Family*. Cambridge, Harvard University Press.

Chiappori P-A., Bourgignon, F., M. Browning and Lechene V. 1993: *Intra Household Allocationand Consumption: A model and Some Evidence from French Data.* Annales d'Economie et de Statistique, vol. 29, pp.137-156. Statistique, vol. 29, pp.137-156.

Duflo, E. 2005: *Gender Equality in Development.* Massachusetts Institute of Technology.

Quisumbing A., Adato, M., B. de la Brière, and Mindek D. 2000: *Final Report: The Impact of PROGRESA on Women's Status and Intrahousehold Relations.* International Food Policy Research Institute, Washington, D.C.

Sen, A. 1990: *More Than 100 Million Women Are Missing.* New York Review of Books, December 20, 1990.

Yunus, M. 1998: *Poverty Alleviation: Is Economics Any Help? Lessons from the Grameen Bank Experience.* Journal of International Affairs, Vol. 52.

WOMEN'S STATUS AND CHILDREN'S FOOD SECURITY IN NEPAL

1. Introduction

This essay examines the impact of women's intra-household status upon children's food security in Nepal. Food security, defined as the access at all times to safe, adequate and nutritious food for a healthy and active life, is greatly contributing to children's normal growth, being the most distinctive feature of children's wellbeing. Globally more than 300 million children are malnourished (UNICEF, 2007). This means a higher risk to catch fatal infections, get permanent damages to intellectual development and growth (Onis et al. 2004). In Nepal children's malnutrition is a severe problem. The prevalence of stunting among under five-year-olds is the fifth worst in the world (51%, UNICEF/Nepal, 2007). Child malnutrition is a sign of poor food security, disease and improper care during illness (Sah, 2005) and it is associated with children's mortality, which in Nepal is alarmingly high (UNICEF/Nepal, 2007). In Nepal malnutrition is not due to the lack of food production, but it is caused by the social problems and more precisely by the low social status of women (Sah, 2005).

Thus, this study attempts to find evidence from Nepalese household data to whether woman's intra-family status has an effect on children's growth (Quisumbing and Maluccio, 2003; Guha-Khasnobis and Hazarika, 2006). The main approach is to test whether the collective model of household holds against the traditionally used unitary model (Becker, 1981). According to the collective models, the distribution of assets in a household is an outcome of Nash Bargaining between its members and the final shares depend on the member specific bargaining powers. Women, who usually have a relatively lower status in developing countries, are considered to invest relatively more on children's wellbeing (Thomas et al, 2004), whereas men tend to invest relatively more in so called adult goods (Duflo, 2000). Most likely according to the traditional role models, where the mother is the primary contact and caretaker of children, play a role here. High relative investments in adult goods can be considered a sign of male dominance.

Previous studies have discussed various, sometimes controversial measures from household data to describe a woman's relative status, such as mobility, age related variables, differences in human and physical capital and working. What comes to female labour supply, many Nepalese women tend to abstain from labour force if families are well-off enough (NLSS 1). Furthermore, the U-hypothesis of female labour market participation suggests, that on low stages of economic development female labour supply tends to decrease with extra

income. Only after reaching a certain stage of economic development, labour supply in the society increases. Then working and labour income can be considered a sign of a bargaining power (e.g. Goldin, 1995). Thus, if the mother has to work, she may be even considered to have less bargaining power. Mothers empowered with education are more likely to perceive their children's illnesses and seek healthcare (Pokhrel and Sauerborn, 2004). What's more, an increase in a woman's marriage age may lead to a more than proportional change in her education attainment (Field and Ambrus, 2005). Thus, the indicators may be connected in a non-linear fashion. On a comfortable wealth level, improvements in e.g. female income have no longer visible effects on children's nutritional status. Earlier studies have noted that some endogeneity has to be tolerated in household models (e.g. in Quisumbing and Maluccio, 2003). For instance the budget shares on adult goods are often considered to provide useful information about women's decisive power, but the shares themselves may be subject to preliminary bargaining. Yet, in NLSS 1 the correlation between the key status variables and adult good expenditure shares was moderate. The dependent variable, food security, is measured with nutritional z-scores for weight and height relative to age and sex, since they convey information of the accumulation of nutrition over time.

The evidence from NLSS 1 supports the collective model as a description of household behaviour, especially upon the implications of the education difference between spouses, mother's knowledge concerning birth controlling methods and mother's age at child birth. The analysis finds evidence that mother's marriage age influences the education difference between spouses. Previous studies from NLSS 1 have shown that in Nepal mothers start controlling their fertility only after delivering a boy (Pokhrel and Sauerborn, 2004). Mothers indeed seem to make decisions in favour of males, since male height and weight is affected positively upon birth controlling knowledge. However mother's age related bargaining power measures seem to improve female children's food security.

In Nepal the socio-economic conditions may have a smaller impact on the status indicators than the group norms, since according to Thapa (1989) the ethnic factor in Nepal has a significant effect on e.g. the timing of the family formation and labour supply. In NLSS 1 a small or positive age difference in favour of the wife does not necessarily imply a higher bargaining power, as it may be a mere norm. For instance among the Tharu, wives are practically always older than their husbands, because an older wife is seen as a more efficient contributor to the household chores.

The rest of this essay is divided into six sections. The following section two goes through conceptual linkages between women's status and children's food security. The third section

discusses the Nepalese context. The fourth describes the data, variables and methods. The fifth analyses the results. The sixth discusses the further research and last section concludes the essay.

2. Conceptual linkages between women's status and children's nutritional status

According to Smith et al. (2003) mother's status affects child nutrition through three main pathways: food security, caring practices and household health environment. Mother's status has an impact on her own personal wellbeing and her capabilities to care for others. In Nepal the woman has the major role in taking care of the family nourishment, hygiene and security. An excess burden of physical labour and maternal malnutrition affect foetal growth, breast milk quality and adequacy as well as mother's capacity to protect and care for children (Mahajan et al. 2005). Mother's ill physical and mental health (e.g. depression) is transmitted to children through increased infection risk and foetal growth retardation, which is again associated with significant retardation on child's physical and mental development (Carter et al. 2001), perinatal and childhood morbidity (Mahajan et al. 2005). Women are seen as more empathetic and altruistic, possibly due to their traditional role models and close contact with children. Moreover, it is well known that mothers use more of their own income to buy food and medicines for their children's needs than men (Smith, 2002). Moreover Nepalese women's income-earning abilities and productivity are inferior to those of men. Too early childbearing, due to family pressures, often causes pregnancy and birth complications (Smith, 2002). Child mothers most likely have relatively lower cognitive abilities to care for children, as the early childbearing often is a reason for not enrolling to school. Research from several countries (e.g. Sandiford et al, 1995), states that literate mothers have better nourished children and lower risks of mortality than illiterate mothers, irrespective of wealth. Nutrition knowledge, caring practices, hygiene and health knowledge, as well as the susceptibility to seek health care for children affect growth. Women with a higher status are more likely to use modern facilities and take the initiative in seeking care for themselves and their children (Caldwell, 1996).

3. Background

Nepal is a landlocked country situated in Southern Asia between India and China (Tibet). It comprises of three main ecological regions: hills, terai[3] and mountains. The regions differ significantly in terms of population (table 1), land, access to food and food grain production, the extent of malnourishment and undernourishment. Nepal is one of the poorest and least urbanized countries in the world (UNICEF, 1992). Half of the population is illiterate and the country ranks the second lowest in South Central Asia in the human development index (144/174, UNDP 2006). Per capita income is the lowest in South Asia. Most of the inhabitants live on agriculture on the hills and on the terai (Chhetry, 2001). At the national level Nepal has been food secure except for the drought years in the end of 1970's. The access to remote areas is highly limited due to the underdeveloped infrastructure and ecological variation. Consequently the hunger remains prevalent in endemic pockets, as food is not evenly distributed[4] (Pyakuryal et al. 2005). The rapid decline of forests, which often is an independent source of subsistence against shortages for women and children, the environmental aspects like heavy monsoon rains and the civil war have take their toll on the livelihoods of the poor. The civil war has claimed 20 000 lives and has brought about destruction to infrastructure and medical facilities (Singh, 2004). The ten year insurgency ended in November 2006 and the Maoist party is now involved in the interim government, which pursues a permanent peace and democracy to the still very disordered country (Embassy of Finland 2007).

Agriculture is becoming increasingly feminized as more men enter the non-farming sectors (ADB, 1999). In addition, the sources of income for farmers have changed. The household- and the farming incomes have decreased five per cent, since agricultural productivity has stagnated from mid-eighties on. On the other hand contribution to non-farm sources has come up from 11% to 14.5% (ADB, 1999). This most likely implies that women's income relative to men is declining. Female productivity is lower at least since female literacy is less than 35 per cent and girls drop out of school earlier than boys.

Population groups, castes and languages are numerous[5] (table 1), which results in great variability in gender equality. The different ethnic groups have their specific beliefs, institutions and languages. For instance some groups have a positive age difference like the

[3] Plains, a grain producing belt stretching from east to west in the South near the border of India. In literature terai is also called tarai.
[4] Recent estimates of IPFRI of the per capita food deficit are 47 kg in the mountains and 32 kg in the hills, even though per capita surplus is 45 kg countrywide.
[5] Depending on the classification method there are records of 40-120 different ethnic groups.

Tharu and some have a very negative difference like the Muslims. Many groups valour monogamy, but some may consider polygamy as normal like Sherpas (Thapa, 1989). Yet, some aspects are quite similar countrywide, such as the importance of maternal schooling to children's health. The caste system is unofficial, but it is strongly controlling the society, which sets special characteristics into women's life (e.g. within some groups widows are considered impure, Galvin, 2005). The gender development index rating for Nepal is poor (138/177, UNDP 2006). Women carry heavy general workloads, high risks of pregnancy and child birth, worse general health, poor nutrition and education, all of which are causing exalted female mortality rates (Kelomaa-Sulonen, 1991). Traditionally husbands and older family members hold the authority over decisions in financial, social and family-planning issues. Even if a woman develops a substantial intra-family status, the community factors still limit her autonomy (Niraula and Morgan, 1996). Vice versa the individual level factors have a greater influence in a less patriarchal context (Morgan & Niraula, 1995).

According to the Hindu[6] traditions marriage is a necessity for a woman. Nepalese laws support this as well (ADB, 1999). Men's bargaining power increases with younger brides (Field and Ambrus, 2005). It is not unusual for a Nepalese woman to marry before menarche or have no say in the selection of her future husband. About 40 per cent of the15 year-old girls are already married. Marriage age laws can often be ignored as these vital events are seldom officially registered (Thapa, 1989). The kin pressures ensure that the first child is born by the age of 15 to 16. In Nepal women tend to start controlling their fertility only after giving birth to a boy, which is reflecting a gender bias[7] (Leone et al. 2003). If there is no son who is entitled to a side on the bargain, male members can acceptably ignore conjugal sharing. Sons continue the family name, can perform funeral rituals and are expected to provide support in the old age (Leone et al. 2003). If the first wife does not deliver a son, the husband may take another wife for financial and religious motives (Leone et al. 2003). Thus for a woman a male progeny is nearly always her most manipulative link.

Boys are prepared for productive work and decision making, while girls are brought up to be housewives, mothers and service providers (Klawon and Tiefenthaler, 2001). Girls have a lack of access to information, knowledge and resources, as they spend their life at home (Niraula and Morgan, 1996). Open discussions between women about menstruation, sex and pregnancy are not common and sexuality is closely guarded by relatives (UNICEF, 1992).

[6] Nepal is the only official Hindu state in the world.

[7] Commonly used indicators are sex ratio at birth and sex specific immunization rate. According to Martorell et al. (1984) there is anthropometric evidence of no gender disparities in the Nepalese Terai in the growth retardation depending on the gender of the child. Secondly according to UNICEF report in 2006, there is no gender disparity in the rate of vaccination against measles, breast feeding or the extent of stunting due to malnutrition.

Normally the female youth has no access to health or sex education or health services to deal their problems, which as well contributes to infant mortality, being one of the highest in the Asian region (64.4/1000 births; UNICEF 2006). Currently over half of the under five year-olds are stunting (UNICEF/NEPAL, 2007). And for the survey sample the figure for 0-3 year olds is 76 per cent. Malnutrition is more common on the mountains than on the terai plains. On the mountains the presence of ancient Tibetan gene pool and altitudinal variation may affect stunting (Pawson, 1976).

4. Data, variables and methodology

All empirical analyses were performed upon the Nepal Living Standards Survey 1. It was conducted by the World Bank and the Central Bureau of Statistics of Nepal (CBS) during 1995-1996 as a part of the living standards measurement survey series (LSMS) of the World Bank[8]. The sample size considers 3,388 households in 73 districts of the country[9]. The data is divided into four strata based on geographic and ecological regions of the country: mountains, urban hills, rural hills and terai-plains. The household questionnaire covers various levels; community, household and its members to gain a full picture of topics such as employment, housing, access to facilities, migration, food expenses, education, health, anthropometrics, marriage and maternity history, wage employment, farming and livestock, non-farm enterprises, credit and savings, remittances and transfers and adequacy of consumption. The sample size for 0-3 year old children is 1600 observations. They are official family members and measured for height and weight. The number of families is 1278, so in one family there can be more than one child.

4.1. Methods for z-scores

Children's anthropometric measurements provide useful information about health outcomes for populations. In addition, these indicators, percentiles and z-scores for weight/height conditional on sex and age, are widely used for measuring hunger, even though they have been subject to controversy (DeRose et al. 1998). This study uses z-scores for the linear regressions, because they are normally distributed. Weight conditional on sex and age, typically varies in the short run and is said to be a good indicator of current health status, whereas height given age and sex is said to be a stock variable of longer run well-being (e.g.

[8] The older dataset was used since the newer NLSS 2 (2003/2004) is lacking the anthropometrics section
[9] Two districts were left out due to their scarce population

DeRose et al. 1998). When either measure is very low, mortality risk rises dramatically (Chen et al, 1980). For neonate children very low (less than 2.5 kg) birth weight indicates problems in birth, diseases, poor maternal health or nutrition. If the child is stunting (abnormal smallness, retardation at growth), and lags severely behind normal growth curves still by the age of two, his/her adulthood height and development will be affected irreversibly. Z-scores are a means for answering how many standard deviations away the observation is from the mean. A positive (negative) z-score indicates that the observation is greater (less) than the mean (table 2 summarizes the implications of z-score values).

The calculating method for z-scores follows the LMS model (Cole and Green, 1992), used in the WHO Child Growth Standards reference data. This reference data on weight distributions was right-skewed, therefore it uses the LMS method, as it utilizes a Box-Cox normal distribution and includes adjustment for kurtosis. Means and standard deviations were computed from z-score values, because the z-score scale is supposed to be linear. The expected mean z-score for the reference population is zero, and the standard deviation value of the z-score is one. The Child Growth Standards reference values for Box-Cox power L(t), median M(t) and coefficient for variation S(t) are from the *WHO Technical Report of Methods and Development 2006*. The method used to calculate z-scores for an observation x of weight or height at age t from NLSS 1 (WHO 2006) is:

$$z_{ind} = \frac{[x/M(t)]^{L(t)} = \quad x - M(t)}{S(t)L(t) \qquad StDev(t).}$$

4.1.1. Z-scores – data problems and solutions

The anthropometrics section in NLSS 1 has some data problems. There are two different variables for child's age: age in months and a birth day in Nepalese calendar. A closer scrutiny showed that a few 'age in months' -records were not in line with the ages calculated from the birth day information.[10]. The records calculated from the birth day information that were not matching age in months figures were replaced by age values in months. The naturally more plausible value was chosen when the monthly age was biologically impossible. Other impossible values were removed. Furthermore, getting reliable birth date information is a typical problem for data from developing countries (and only 30 per cent of small children had birth certificates in NLSS 1). A few observations on heights and weights

[10] The ages were calculated by transforming the Nepalese birthdays and interview dates into Julian dates by subtracting 56 years, 8 months and 17 days. Then the taking the date intervals in days and converted those to monthly figures. Dates lacking the *dd* information were added the expectation value for the *dd* of a month (the average number of days in a month divided by two: 30.33/2=15.67).

have some clearly implausible value pairs as well. This was solved by removing the clearly incorrect, biologically implausible values (e.g. an eight month-old cannot be 110 centimetres tall). Height measuring position was supposed to be standing after two years of age, since normally they already walk and neonate infants may be complex to measure for height correctly as they are still bent.

4.2. Women's intra-family status indicators

The previous research has discussed many indicators for women's status; quantifiable and qualitative (social norms, laws and institutions, Agarwal, 1997). Some status indicators are *sequentially interlinked* i.e. determinants of bargaining power, but also need to be bargained for (Agarwal, 1997). In addition the outcomes from one bargaining process may affect positions in the next round as an iterative process. Parashar (2003) has divided indicators in three groups; giving evidence of empowerment, being sources to empowerment or being a setting for empowerment. The main indicators examined in this essay are indirect[11]. Bargaining itself may be implicit and sometimes in Nepal the weaker side may end up in a more favourable outcome without open contestation. The variables are discussed next.

Marriage age affects a woman's life in many ways it predefines the start of the reproductive cycle[12], the use of contraceptives and education attainment rather well. Delayed marriages are associated with more preventive health care (Field and Ambrus, 2005). Often early marriage is a reason for not enrolling in secondary or tertiary school (Field and Ambrus, 2005). Other options for child mothers are as well limited. Studies show, that adolescent brides have more domestic work and domination by their spouses. Even unschooled women who marry later face fewer restrictions by husbands and in-laws[13] with respect to consumption and mobility (Field and Ambrus, 2005). Married adolescents have fewer social contacts and are less likely discuss sexual issues with their friends, but simultaneously they have higher levels of sexual risks and activity. NLSS 1 shows that birth controlling knowledge is linked to later marriage through education; schooled women tend to have more knowledge about contraceptives. Younger bride maximises husband's fertility and bargaining power, since they are more easily moulded into the roles desired by the husband and his family. This can be seen in rural Bangladesh in the increasing amounts of dowries

[11] In this study there are no direct indicators such as owning assets, permission to exit the house and prevalence domestic violence (Parashar, 2003).
[12] With the condition that preventives use is not common and the couple lives under the same roof. In Nepal the average female marriage age is 16.9 years (NLSS 1), hence some females marry before menarche.
[13] In Nepal the bride usually joins the groom's household (Niraula and Morgan, 1996).

with each additional year that the marriage is postponed (Field and Ambrus, 2005). In Nepal marriages are often arranged by parents, therefore love is rarely the reason for the commitment (Thapa, 1989).

Female autonomy tends to increase with the ability to control sexuality (Dyson and Moore, 1983). The demand for children, boy preference, and contraceptives use goes hand in hand (Niraula & Morgan, 1996). In rural societies children especially sons, are seen as economic assets in labour intensive farming practices (UNICEF, 1992). Women who have many children, particularly males, are valued higher within the family in the Nepalese, strongly patriarchal society. A large number of siblings in a poor household has many implications to a child's food security and development. In Nepal adult literacy correlates strongly with the use of family planning methods (Kelomaa-Sulonen, 1991). One could assume also that the older the mother the more knowledge. However in the sample of 0-3 year old children, older mothers do not seem to have a lot of knowledge of contraceptives and the use is not common[14]. However this may be explained with the fact that if they had had the knowledge they would possibly not all be in the sample. For this paper, the mother's awareness about birth controlling methods is used as a proxy for the ability to control her fertility.

The intra-household balance of power tends to improve with similar schooling attainments (Quinsumbing and Hallman, 2006). A small education difference ensures more equal capabilities in life and equal knowledge over various matters, which renders the initial bargaining positions more equal. In this essay the inter-spousal education ratio is expressed by mother's years relative father's years, where BA (or bachelor) stands for 15 years of completed studies, MA (or master) for 17 years and a PhD for 21 years of completed studies.

As noted earlier an early marriage is associated with a lower schooling attainment. This essay attempts to find whether marriage age has synergies with the education gap in Nepal. This is tested with a multiplicative variable:

*Multiplic = 1/mother's marriage age * (Educdif),* where (1)
Educdif = father's education – mother's education.

The larger *Multiplic* is the less power woman has. If the variable gets statistically significant values for z-scores, it suggests that by increasing marriage age the impact of the education gap will decrease. The ratio of education attainments is correlated with mother's absolute

[14] 14 % of respondents or respondent's spouses use contraceptives. 38 % were not aware birth controlling methods.

years of schooling. Therefore two separate tests were done; the first with all the variables and the second without mother's years of schooling.

Countries with a small per cent age difference are for most part characterized with a relatively high status of women, measured with indicators such as education and age differences (Casterline et al. 1986). The age gap between spouses influences many variables such as fertility, marital stability, marital satisfaction, family size preferences and contraceptives use (Casterline et al. 1986). A large age difference may cause an inferior bargaining position for the wife, as older husband may easily mould the younger wife to a preferred role. Yet, in the Nepalese society the age difference does not seem striking (Casterline et al. 1986). In Nepal regional, religious as well as ethnicity related differences seem to play an important role, so the average differences do not tell the whole story. Large age difference is strongly related to the low caste groups such as Tharu (positive gap) and Muslims (negative gap) (NLSS 1). Tharu women's status is not clearly better than the status of Muslims even though the age gap is reversed for the Tharu. Consequently it most likely is not a reliable indicator of intra-family status.

Employment as a proxy for female autonomy is problematic, though the accruing income from working is found to be related to women's bargaining power in several studies (e.g. Haddad et al. 1997). Usually women's bargaining power affects labour allocation decisions within households, but working has different implications of women's power depending on the stage of economic development. Female labour force participation has a tendency to decline in the early stages of development and then increase. This is referred as the U-hypothesis of female labour market participation in the course of economic development (e.g. Goldin 1995). Nepal is allocated in the beginning of the U-curve (Goldin, 1995). The female labour market participation rate was roughly 58 per cent in 1995 (ILO, 2007) and women working outside home are normally poorly educated and belong to the lowest castes (NLSS 1). Hence maternal working may even indicate a low intra-family position. Also according to Momsen (1991), employment in the agricultural or informal sector does not necessarily raise a woman's status. Moreover, working is not always an attractive option; in Nepal women's employment conditions have worsened and gender based discrimination has increased (Khan, 1997).

Remittances are a form of unearned income, suggesting independence of labour supply decisions. According to Thomas (1990), unearned income in mother's hands has a bigger effect on the health of the family than under the control of the father and for child survival

chances the effect is almost twenty times bigger. However, in NLSS 1 remittances to women are rare and nothing implies that the woman has the control over the money.

Variables such as the distance to the nearest health post and distance to a local shop were examined to see the effects of women's mobility. The further away the family lives from the village centre (measured by the distance to a shop), the lower the mobility and access to information and social contacts over the marketplace. The freedom of movement can though be limited by social norms as well.

4.3. Estimation strategy

Three regression equations were formed in order to measure how the status variables affect the three measures of malnutrition[15]:

$$waz\ (weight\text{-}for\text{-}height\ z\text{-}score) = \alpha_1\ Agebirth + \alpha_2\ Birthco + \alpha_3\ Agemar + \alpha_4\ Educdif + \alpha_5\ Distloc + \alpha_6\ Multplic + \alpha_7\ Remitinc + \beta_1 X' + e_1, \quad (2)$$

$$haz\ (height\text{-}for\text{-}age\ z\text{-}score) = \gamma_1\ Agebirth + \gamma_2\ Birthco + \gamma_3\ Agemar + \gamma_4\ Educdif + \gamma_5\ Distloc + \gamma_6\ Multiplic + \gamma_7\ Remitinc + \beta_2 X' + e_2, \quad (3)$$

$$whz\ (weight\text{-}for\text{-}age\ z\text{-}score) = \delta_1\ Agebirth + \delta_2\ Birthco + \delta_3\ Agemar + \delta_4 Educdif + \delta_5 Distloc + \delta_6\ Multiplic + \delta_7 Remitinc + \beta_3 X' + e_3, \quad (4)$$

Agebirth is the mother's childbearing age. *Birthco* is a dummy variable of the mother's awareness of birth controlling methods (0=no, 1=yes). *Agemar* is the mother's age at marriage. *Educdif* is the mother's education divided by father's education. *Distloc* is the distance to the nearest shop in hours. *Multiplic* is the equation (1). *Remitinc* is the remittances received by the mother in 1000 rupees. X' is a vector of other correlates of children's anthropometric nutritional status. The error terms are e_1, e_2 and e_3. The total and the male and the female samples were examined with these equations. The expected effects of the status variables and selected controls are presented in table 3. The sign in the last column means the sign of the expected regression coefficient.

4.4. Other variables

Other essential variables affecting food security can be classified to following levels: mother, child, household, ethnicity and region. Mother's characteristics such as education attainment are

[15] The SAS Enterprise Guide 3.0 was used for all computations.

usually linked to poor childcare knowledge (Block, 2007). It as well correlates with fertility, health and hygiene education. Mother's absolute education may as well affect her bargaining power. The child level variables show e.g. if older children are less food secure. Past or chronic illnesses e.g. recently experienced diarrhoea normally affects weight considerably. The model has three breastfeeding variables classified by age: 0-6 months and not breastfed, 13-24 months and not breastfed, over 25 months and exclusively breastfed. Exclusive breastfeeding has a positive physiological effect on child health until the age of six months. Normally after two years normal growth requires solid foods. Household variables include wealth, amenities, hygiene, and family characteristics. Safe water and a toilet both remain very scarce in Nepal and these tend to have a positive impact on child health. Birth order may affect the way child is treated in the household. However, it has a strong correlation with the family size, thus only the latter is used in the model. The social group tends to have different implications to child health and gender, which are examined with ethnic dummy variables. Health hazards and the way of living vary considerably according to the climatic zone (Kelomaa-Sulonen, 1991). For example the monsoon increases considerably the incidence of children's infectious diseases (Kelomaa-Sulonen, 1991).

4.5. Expenditure shares

According to Duflo (2000) in male dominant families budget shares on adult goods tend to increase more when extra-income is in the hands of men. *Ceteris paribus* an increase in the expenditure shares on goods exclusively for adults, is supposed to decrease the relative expenditures on children's goods (Guha-Khasnobis and Hazarika, 2006). Expenditure shares are subject to intra-household bargaining. Thus improvements in women's status suggest a decrease in male-preferred goods. Adult goods consumption in Nepal is far more common among males (Dhital et al. 2001). In addition an extensive use of adult goods is related to an increased intra-family violence and suppression of the weakest family members. Adult goods expenditure share as a determinant of woman's bargaining power is a complex measure. A low expenditure share on adult goods does not suggest that a woman has a higher status, since adult goods' purchasing decisions may be determined by the social group, since among Brahmins alcohol use has not traditionally been acceptable, but among Tamangs it may even be a necessity in some occasions. However adult goods were tested with correlation- and tobit analysis to see the possible effects of the model variables and especially the key status variables (to see the possible endogeneity). Adult goods include wine, gin, whiskey, beer,

jandh (homemade beer), other alcoholic drinks, cigarettes, tobacco, jarda, khaini and betel nut.

The simplest way to explore mother's status implications on household investments on children's wellbeing, would naturally be analyzing the household expenditure shares upon small children's goods. However these goods, namely *Baby milk and milk powder*, were purchased or received in-kind only in 28 cases, most of which were correlated with the Muslims.

5. Empirical findings

5.1. Descriptive statistics

Table 4 presents descriptive statistics for the sample. Z-scores are normally distributed[16]. Means and standard deviations show that Nepalese children are malnourished; too short and too light for their age. The mean weight-for-age score -2.35 shows that the children are severely underweight, height-for-age z-score -2.04 shows severe stunting (a sign of chronic malnutrition) and weight-for-height -1.11 signifies moderate wasting. Body mass index is 15.6 for over 2 year-olds. 78 per cent are given just breast milk. 52 per cent are male. 76 per cent of the children were immunized, of which females represent slightly less. 35 per cent of the children had been ill in the past according to the mother. However boys were reported ill more often than girls (38% are males and 32% females). It would be unlikely that females fall sick less frequently. Pokhrel and Sauerborn (2004) state that gender biases in Nepal are in fact visible in the perception of illnesses and that household surveys do not capture childhood morbidity well, as clearly sick children are not reported ill. 1 per cent of the children suffer from chronic diseases. Birth order for the children in the sample is in average 6.44.

5.1.1. Parents

Fathers are in average 32 years and mothers 27 years old. 60 per cent of fathers are literate and have completed in average almost four classes of school, whereas only 20 per cent of mothers are literate and their level of schooling is 1.3 years, hence in average the gap between parents is 2.6 years. Mothers' marrying age is in average 16.8 years and 99 per cent

[16] The z-scores for haz and whz were normally distributed according to Kolmogorov-Smirnov sigmas. See graph 1.

of them are married. 56 per cent of the mothers were aware of birth controlling methods. Mothers' mean childbearing age in the sample of 0-3 year-olds is 25.7 years, whereas for the first-borns it is 19.6 years. 26 per cent of mothers have been ill during the past month and 6 per cent suffer from chronic illnesses. The average amount of remittances received during the past 12 months, was 4466 rupees of which 309.55 (7%) accrued to mothers (amounts received in kind and in cash). 9 per cent works outside for wage and 22 per cent of the mothers had received remittances. Every third remittance is coming from the husband, thus these remittances cannot be clearly considered to increase woman's intra-family status relative to the man.

5.1.2. Household

Value of food consumed in a household (sum of total expenditures; produced and received in kind) is in average 3363.90 rupees per month. The share of adult goods is in average 10 percent of expenditures. The share of baby milk/-powder (consumed in 2 per cent of the households) of purchases represents 0.2 per cent. House sale value is in average around 124 103 rupees[17]. The value of the livestock is in average 27 047 rupees and 82 per cent owns land. 11 per cent have water piped to the house, 84.5 per cent have no electricity, 87 per cent have no sanitation, 76 per cent have no toilet and 97 per cent have no garbage disposal. The distance to a health post is in average 1.35 hours, to a local shop 41 minutes and to a paved road it is over 11 hours. 11 per cent have migrated and 33 per cent of the households are multigenerational. 87 per cent of household heads are Hindus. Majority, 19 per cent are Chhetry. 41 per cent live on the Terai plains, 35 per cent on the rural hills, 14 on the mountains and 10 per cent on the urban hills.

5.2. OLS results

OLS estimates for the weight-age, height-age and weight-height models are presented in the tables 10, 11 and 12. Tables include the total, male and female samples. T-values are next to the estimates and *, **, *** represent the p-values on 1%, 5% and 10% significance levels. The statistically significant results are discussed next.

5.2.1. Status indicators

[17] In current Euro exchange rate this represents 1477 euros.

The multiplicative variable has significant positive signs for the weight-age and height-age z-scores. This suggests that a rise in the marriage age has an impact of decreasing the inter-spousal education gap. Moreover, later marriage age, which accordingly improves mother's status in terms of a smaller education gap, has as well positive significant sign for the female children's weight-age indicator. This suggests that an increase in the marriage age has a positive impact on female children's food security. The mothers who had married after the age of 20 (table 5), have children that in average are in a slightly better condition. Relatively these mothers tend to have fewer children currently, more female children, more education, smaller education difference and age difference. Marriage ages on the terai-plain are lower and some ethnic groups marry relatively later than others (i.e Newar and Limbu). This is in line with Yabiku (2003), who states that community variables have an impact on the marriage ages in the Chitwan district on the terai-plain. Mother's childbearing age has very significant positive signs upon the weight-age indicators and in particular upon female weight-age and height-age z-scores, suggesting that a higher childbearing age has positive impacts on children's food security.

Mother's awareness of birth controlling methods and the consequently increased ability to control her fertility has a positive impact on children's food security; the weight-age and height-age indicators have positive signs. These are mostly coming from the estimates upon the male sample, suggesting the prevalence of a gender bias. As stated earlier, in Nepal women tend to control their fertility only after giving birth to a boy, as it brings a better bargaining position within the household. Therefore when already there is a boy, as is in the male sample, these mothers may start searching methods for controlling fertility and concentrating on the wellbeing of the male offspring. Pearson correlation coefficients for birth controlling knowledge and analysis variables (table 6) show that the ethnic groups; Chhetrys, Muslims and Limbus are related to a scarce birth controlling knowledge, whereas Newars and Brahmins are related to better knowledge. Birth controlling knowledge is positively correlated with the urban hills, educated mothers and expenditures. Consequently the periphery areas such as the mountains and places far away from the local shop or health post are negatively correlated with the knowledge.

Education difference ratio (mother's/father's education) has positive signs as hypothesized, but neither of them is significant in the model 1, because of correlations with other schooling related variables. Hence, in the model 2, without mother's education level, the schooling difference shows significant positive signs for weight-age and weight-height z-scores. For male weight-height indicator the sign is positive, suggesting that the male

offspring benefits more from a decreased education difference. Mother's schooling level has statistically significant estimates in line with the hypothesis, suggesting that maternal education improves child health. The male sample estimates show that mother's schooling affects male height age indicator positively. Females are not as much affected by mother's education.

In Nepal the mean age difference is not internationally striking (Casterline 1986), possibly due to the vastly differing social customs among the groups. The signs are in line with the hypothesis, but statistically insignificant. In Nepal the husband is in average four years older than his wife. However, the age gap has positive correlation coefficients with the Tharu-tribe, suggesting that they have the highest age gaps and even in favour of the wife (the wife is in average over 3 years older than the husband). The correlation table 7 shows the important Pearson correlations for the age gap. Families with a considerable age gap tend to be large and multigenerational, as Tharu households indeed are (even up to 50 people living in so called long houses, Guneratne, 1998).

OLS estimates show that if the mother works for wage, children are more malnourished. The signs are especially negative for the weight-age scores. The male weight-age and height-age indicators are affected more negatively when the mother is working. Working is thus more likely an indicating low intra-family status. Moreover, the families where mother works for wage are correlated with poverty (they have low levels of livestock only 6 %, no sanitation and no toilets), low caste (e.g. Sarki[18]) and low maternal education. However, they are correlated with more birth control awareness and thus also their family size tends to be smaller (see correlations in table 8). Muslims who are of low ranking in the caste strata are correlated with low levels of working, but still women's position among them measured with other indicators is low. Thus, the aforementioned assertion cannot be reversed to imply that not working for wage would reflect a better status for the mother. Estimate signs upon the remittances to mothers[19], income independent of labour decisions, are positive – in line with the hypothesis, but they are statistically insignificant.

Mother's physical health affects child health. Her recent illnesses have a negative impact on the weight- and height-age z-scores. Mother's chronic illnesses affect male weight-age and height-age indicators negatively.

Children's age categories show negative and significant estimates for weight- and height-age z-scores. Testing the model with child's age in months showed that the older the child

[18] The Sarki are so called untouchables. Part of them belongs to the working bhul caste "the shoemakers" who are inferior to many other castes (even inferior to other Dalits Kami and Damai) as they eat buffaloes and cows.
[19] Only 41 mothers had received remittances in the sample. Those were paid by husbands and other relatives. Remittances were related to young mothers, nuclear families and the ethnic group of Chhetry.

the more malnourished he/she is. There may though be a slight bias, since children who are more recently born are easier to estimate for age. The age category of 13 to 24 months had the most significant negative signs for their estimates, suggesting that children between one to two years are most malnourished. Male children have a significant negative estimate upon their height for age, suggesting that they are more stunting than girls (graph 2). Standard deviation of height-age z-scores for boys sample is as well larger than for girls and the mean is more negative.

Children who suffer from chronic illnesses tend to grow sluggishly, according to the negative signs upon weight- and height-age indicators. Moreover, the chronically ill females have negative signs for all food security indicators. Male food security does not seem to be affected as significantly. This suggests that chronic illnesses retard in particular female growth. Recent illnesses (e.g. diarrhoea) affect very negatively children's weight-height ratio. This is intuitive as recent illnesses cut down the short term weight, but their impact cannot yet be seen in the longer term malnutrition indicators. The higher incidence of recent illnesses is strongly correlated with having no toilet (table 12), which is intuitive, since better hygiene protects from diseases. If the child is over two years old and still exclusively breastfed, all z-scores show very negative signs. This was expected, since normal growth after two years requires other foods as well. Breastfeeding variables show, that if a child of 0-6 months is given other milk daily as well, he/she is more food secure; estimates for weight for age have significant positive signs. This is evident as maternal feeding practices and nutrition knowledge are found to be important to child micronutrient status in previous studies (e.g. Christaensen and Alderman, 2004).

Natural logarithm of family size has statistically very significant negative signs for weight related z-scores, suggesting that a large family size has strong negative impacts on the short term food security. Female weight indicators are more negatively affected by a high number of siblings, which is implying gender bias. However if the family is extended estimates suggest that children are doing better, especially males are heavier for their height[20], which shows that having relatives benefits the males in particular. Having relatives under the same roof ensures support in childcare and better access to knowledge. According to Momsen (1991) in Nepal household tasks are normally shared between women in extended families. The contact to the natal kin provides access to social resources such as information, economic assistance as well as political support (Niraula and Morgan, 1996). If

[20] The model was tested for the effects of birth order; in the test family size was replaced with birth order variable. Results show that for the total sample birth order has no effects, because birth order affects male weight and height age indicators positively, but equivalent indicators for females negatively. The p-values are around 0.16 so statistically levels are not significant enough. This suggests gender bias, youngest females are neglected, but youngest males favoured.

the family is ranked poor (dummy variable), children are less food secure. Especially males have more negative signs for weight- and height-age indicators. Nonetheless the household value has a positive impact on the female weight for age. Children in families with more cattle are more food secure, as the natural logarithm of livestock has a positive significant estimate upon weight for age. Intuitively children in families that have water piped to the house are taller for their age, according the height-age estimates. Having no toilet clearly affects children's susceptibility to catch infectious diseases, since weight-age and weight-height signs are significantly negative.

According to Kelomaa-Sulonen (1991) in Nepal the health sector has clear shortcomings. Thus a short distance to a health post does not necessarily improve child growth. The estimates are suggesting that the further away the health post is the heavier children are. A better indicator for in this setting would most likely be the distance to a traditional healer. On the urban hills children's weight-age indicators have positive signs, whereas on the terai-plains children's weight for height has significantly negative signs. This is suggesting that on the southern areas children tend to be relatively underweight. If the family has migrated children are doing worse; signs are significantly negative upon weight for height. Ethnicity shows sex preference and clear differences for children's food security. Tamang, Magar (females) and Rai (females) are not as underweight (the signs upon weight for age are significant and positive). Surprisingly two of the higher castes, Brahmin and Chhetry have negative signs for estimates upon male weight for height, suggesting that males are more underweight than in the sample in average. Among Limbu the relative importance of a male progeny for a woman's status is fundamental (e.g. Leone et al. 2003; Acharya, 2004). This shows in the statistically positive signs for boys' height for age estimates and significant negative signs for girls' height for age estimates among the Limbu. Yadav/Ahir children have negative significant estimates for the total population height-age indicator and female weight-age indicator, as among them the sex preference is very influential (Leone et al. 2003).

5.2.2. Adult goods expenditure shares

The OLS results show that an increase in adult goods expenditures has a negative impact on male height for age (table 10). This suggests that adult goods' use has a negative effect on stunting. On the contrary children's weight for height and weight for age indicators are correlated positively with adult goods. The weight for height indicator has a positive sign in the OLS analysis (table 12), suggesting that even though children may be stunted (negative

sign upon height for age) they are not underweight for their height in families where adult goods share of the budget is high. Table 9 presents correlation coefficients for variables that correlate the most with adult goods' expenditure shares. It shows that a high expenditure share of adult goods is correlated with a higher incidence of mothers' and children's recent illnesses. This may suggest that an excess investment in adult goods, probably at the expense of women's and children's essential goods, has a negative impact on these illnesses. Or it may be because in Nepal females often use alcohol as a medicine or a painkiller (Dhital et al. 2001). It shows that households on the hills tend to invest relatively more from their budget on adult goods. Especially Tamangs have considerably high correlations. According to Dhital et al. (2001) among Tamangs alcohol is an essential, often compulsory substance in many cultural and ritual ceremonies. Among them it is served to all; even to women during maternal period and children. Alcohol use among Nepalese women tends to rise with age (Dhital et al. 2001). The correlation analysis shows that mother's marriage age is positively correlated with adult goods, suggesting that in families where marriage takes place later, and more adult goods substances are used, since these women are relatively older. According to Dhital et al. (2001) alcohol use can be determined by three factors: availability, accessibility and the extent mobility. Hence poor families with low expenditures do not buy adult goods (table 9). The tobit-model and correlation analysis did not result in any significant evidence concerning the key status variables, suggesting that endogeneity between adult goods' expenditure shares and status variables in the model is low.

6. Further interest

The Nepalese civil war started slightly after the collection of the NLSS 1 data. It has affected people's lives, especially low caste women and children (Bishwakarma, 2004). How have the civil war and the absence of males from the household changed women's autonomy and children's food security in Nepal? Which status indicators are affected the most by the war? The NLSS 2 panel data enables to have a look on how the mothers and the children from NLSS 1 have gone through the civil war years.

7. Conclusion

Nepal is one of the poorest countries in the world with a remarkably rich ethnical identity, which results in a wide variability in women's status. The average status of a Nepalese woman is low in the society and she is traditionally considered inferior to her husband. This most likely affects children's growth and food security, as the mother and the child are tightly interlinked, especially when the child is very young. This study found evidence for the relation between women's status and children's food security. In Nepal a rise in mother's marriage age has an effect of decreasing the inter-spousal age difference. Mother's childbearing age, which is linked to her marriage age, has positive significant estimates in the model, suggesting that an increase in the childbearing age leads to an increase in the intra-family status and children's food security. A decrease in the education difference has an impact of improving children's food security in terms of increased weight for age and weight for height. Estimates suggest as well that mother's knowledge about fertility controlling methods influences children's weight-age z-scores positively and male food security in particular. Decrease in the family size tends to affect positively child health as well as living in an extended family. Hygiene tends to affect child health positively. If the child is exclusively breastfed after the age of two, the children tend to be lighter and shorter for their age. This suggests that feeding practices and nutritional education affects child health in Nepal. Wealth improves children's food security. Low caste children are more likely to be underweight and stunting. On the terai-plains children seem to be relatively lighter for their height. In Nepal maternal working seems to be related to a low female status and children's low food security. Working is more common among the poor and the lowest caste ethnic groups. An increase in the adult goods expenditure shares has a negative impact on the male height for age. Age differences are related to a few ethnic groups; in the average the age gap in Nepal is not striking. Some ethnic groups face enormous discrimination and there women often suffer it double.

References

Acharya, S. 2004: *Democracy, Gender Equality, and Women's Literacy: Experience from Nepal.* UNESCO Kathmandu Series of Monographs and Working Papers, No 1.

ADB, Asian Development Bank. 1999: *Country Briefing Paper Women in Nepal.* Programs Department West, Division 1. SODC.

Agarwal, B. 1997: *"Bargaining" and gender relations: within and beyond the household.* Routledge, Taylor & Francis Group, Volume 3, Number 1 / March 1, IAFFE 1997.

Becker, G. 1981: *A Treatise on the Family*. Cambridge, Harvard University Press.

Bishwakarma, P. 2004: *The Situation Analysis for Dalit Women of Nepal.* FES/Nepal National Seminar "Raising Dalit Participation in Governance". Centre for Economic and Technical Studies.

Block, S. 2007: *Maternal nutrition knowledge versus schooling as determinants of child micronutrient status*. Oxford Economic Papers 59, 330-353.

Caldwell, B. 1996: *The family and demographic change in Sri Lanka.* Health Transition Review, Vol. 6, Supplement, pp. 45-60.

Carter, A. S., Garrity-Rokous, F. E., Chazan-Cohen, R., Little, C. and Briggs-Gowan, M. J. 2001: *Maternal Depression and Comorbidity: Predicting Early Parenting, Attachment Security, and Toddler Social-Emotional Problems and Competencies.* Journal of the American Academy of Child & Adolescent Psychiatry. 40(1):18-26, January 2001.

Casterline, J.B., Williams, L. and McDonald, P. 1986: *The Age Difference Between Spouses: Variations among Developing Countries.* Population Studies, 40, (p.353-374), JSTOR.

Chen, L.C., Chowdhury, A. and Huffman, S.L. 1980: *Anthropometric assessment of energy-protein malnutrition and subsequent risk of mortality among preschool aged children.* American Journal of Clinical Nutrition, Vol 33, 1836-1845.

Chhetry, D. 2001: *Understanding Rural Poverty in Nepal.* ADB. Asia and Pacific Forum on Poverty.

Christiaensen, L. and Alderman, H. 2004: *Child malnutrition in Ethiopia: can maternal knowledge augment the role of income?* Economic Development and Cultural Change, 52, 287-312.

Cole, T. and Green, P. 1992: *Smoothing reference centile curves: the LMS method and penalized likelihood.* Stat Med, 1992 - ncbi.nlm.nih.gov.

DeRose, L., Messer, E. and Millman, S. 1998: *Who's hungry? And how do we know? Food shortage, poverty, and deprivation*. Ch. 2. The United Nations University Press.

Dhital, R., Subedi, G., Gurung, Y.B. and Hamal, B. 2001: *Alcohol and Drug Use in Nepal with Reference to Children.* CWIN Nepal.

Duflo, E. 2000: *Child Health and Household Resources in South Africa: Evidence from the Old Age Pension Program*, American Economic Review.

Dyson, T. and Moore, M. 1983: *On Kinship Structure, female autonomy, and Demographic Behaviour in India.* Population and Development Review 9, 35-60.

Field, E. and Ambrus, A. 2005: *Early Marriage and Female Schooling in Bangladesh*, Harvard Papers.

Galvin, K. L. 2005: *Forbidden Red: Widowhood in Urban Nepal.* Washington State University.

Goldin, C. 1995: *The U-Shaped Female Labor Force Function in Economic Development and Economic History.* T. Paul Schultz, ed. Investment in Women's Human Capital and Economic Development, Chicago: University of Chicago Press, Ch. 3, pp. 61-90.

Guha-Khasnobis, B. and Hazarika, G. 2006: *Women's status and children's food security in Pakistan.* UNU-WIDER working paper.

Guneratne, A. 1998: *Modernization, the State, and the Construction of a Tharu Identity in Nepal.* The Journal of Asian Studies, Vol. 57, No. 3. (Aug., 1998), pp. 749-773.

Haddad, L., Hoddinott, J. and Alderman, H. 1997: *Intrahousehold Resource Allocation in Developing Countries: Methods, Models and Policy.* IFPRI.

IPFRI: http://www.ifpri.org/divs/fcnd/dp/papers/fcndp86.pdf (1.4.2007)

ILO 2007: http://www.ilo.org/public/english/employment/gems/eeo/download/nepal.pdf (13.8.2007)

Kelomaa-Sulonen, K. 1991: *Country Profiles 2, Health Sector in Nepal, A review of available information and preliminary problem analysis.* HEDEC - FINNIDA.

Khan, A.R. 1997: *Globalization and Sustainable Human Development: An Assesment of Challenges Facing Nepal.* Occasional Paper. UNCTAD/EDM Misc. 124.

Klawon, E. and Tiefenthaler, J. 2001: *Bargaining over family size: The determinants of fertility in Brazil.* Population Research and Policy Review 20: 423–440, 2001, Kluwer Academic Publishers.

Leone, T. and Matthews, Z. & Dalla Zuanna G. 2003: *Impact and Determinants of Sex Preference in Nepal.* International Family Planning Perspectives Volume 29, Number 2, June 2003.

Lethen, J. 1996: *Statistical class notes.* http://www.stat.tamu.edu/stat30x/notes/node34.html. (1.4.2007)

Mahajan, S. D., Singh S., Shah P., Gupta N. and Kochupillai N. 2005: *Effect of Maternal Malnutrition and Anemia on the Endocrine Regulation of Fetal Growth.* Endocrine Research, Volume 30, Issue 2 January 2005, pages 189 – 203.

Martorell, R., Leslie, J. and Moock, P.R. 1984: *Characteristics and determinants of child nutritional status in Nepal.* Am J Clin Nutr, 1984.

Momsen, J.H. 1991: *Women and Development in the Third World.* New York, Routledge.

Niraula, B. B. and Morgan, P. 1995: *Gender Inequality and Fertility in two Nepali Villages.* Population and Development Review, vol 21 No 3.

Niraula, B. B. and Morgan, P. 1996: *Marriage Formation, Post-marital Contact with Natal Kin and Autonomy of Women: Evidence from Two Nepali Settings.* Population Studies, p.35-50. LSE.

Onis, M., Blössner, M., Borghi, E., Morris, R. and Frongillo, E. A. 2004: *Methodology for estimating regional and global trends of child malnutrition.* Int. J. Epidemiol. Advance Access.

Parashar, S. 2003: *A Multifaceted and Multi-dimensional Approach to Women's Empowerment and its Links to the Nutritional Status and Immunization of Children in India.* Princeton University.

Pawson, I. G. 1976: *Growth and Development in High Altitude Populations: A Review of Ethiopian, Peruvian, and Nepalese Studies.* Proceedings of the Royal Society of London. Series B, Biological Sciences, Vol. 194, No. 1114. A Discussion on Human Adaptability in Ethiopia (Aug. 27, 1976), pp. 83-98.

Pokhrel, S. and Sauerborn, R. 2004: *Household decision-making on child health care in developing countries: the case of Nepal.* Health Policy Plan. 2004 Jul;19(4):218-33.

Pyakuryal, B., Thapa, Y.B. and Roy, D. 2005: *Trade Liberalisation and Food Security in Nepal.* IPFRI. MTID Discussion Paper No. 88.

Quinsumbing, A. R. and Hallman, K. 2006: *Marriage in Transition: Evidence on Age, Education, and Assets from Six Developing Countries, the Changing Transitions to Adulthood in Developing Countries.* Selected Studies, CPOP. National Academies of Press.

Quinsumbing A. R. and Maluccio J.A. 2003: *Resources at Marriage and Intrahousehold Allocation: Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa* Oxford Bulletin of Economics and Statistics, 65, 3 (2003) 0305-9049.

Sah, N. 2005: *Determinants of Child Malnutrition in Nepal: A Case Analysis from Dhanusha, Central Terai of Nepal.* Save the Children Japan-Nepal Office.

Sandiford, P., Cassel, J., Montenegro, M. and Sanchez, G. 1995: *The Impact of Women's Literacy on Child Health and its Interaction with Access to Health Services.* Population Studies, Volume 49, Issue 1 March 1995, pages 5 – 17.

Singh, S. 2004: *Impact of long-term political conflict on population health in Nepal.* 2004 Canadian Medical Association.

Smith, L. C., Ramakrishnan, U., Ndiaye, A., Haddad, L. and Martorell, R. 2003: *The Importance of Women's Status for Child Nutrition in Developing Countries.* South Asian Association for Regional Cooperation SAARC, IPRFI. Research report 131.

Smith S. 2002: Too *much too young? In Nepal more a case of too little, too young.* International Journal of Epidemiology, IEA

Stifel, D. and Alderman, H. 2006: *The "Glass of Milk" Subsidy Program and Malnutrition in Peru.*
World Bank Econ Rev. 20, 421-448.

Thapa, S. 1989: *The Ethnic factor in the Timing of Family Formation in Nepal.* Asia-Pacific Population Journal, Vol. 4, No. 1

Thomas, D. 1990: *Intra-Household Resource Allocation: An Inferential Approach.*
The Journal of Human Resources, Vol. 25, No. 4. (Autumn, 1990), pp. 635-664.

Thomas, D., Rubalcava, L. and Teruel, G. 2004: *Spending, Saving and Public Transfers Paid to Women.* (August 1, 2004). California Center for Population Research. On-Line Working Paper Series. Paper CCPR-024-04.

Yabiku, S.T. 2003: *Neighbors or Neighborhoods? Effects on Marriage Timing in Nepal.* Population Association of America, Minneapolis.

UNDP 2006: Human Development Indicators/ Country Fact Sheets/ Nepal (1.5.2007)

UNICEF/NEPAL 2007: http://www.unicef.org/infobycountry/nepal_nepal_statistics.html (26.3.2007).

UNICEF 2006: *Situation of women and Children in Nepal 2006.* Ch. 7, 9.
http://www.un.org.np/reports/UNICEF/2006/situation-analysis (1.4.2007)

UNICEF 2007: *The State of the World's Children 2007.*
http://www.unicef.org/sowc07/profiles/inequality_household.php. (1.4.2007)

UNICEF, HMG 1992: *Children and women of Nepal: Situation analysis of 1992.*Kathmandu Nepal.

World Health Organization and CDC, 2006: *Technical report of methods and development.*
http://www.who.int/childgrowth/standards/technical_report/en/index.html (1.6.2007)
LMS model reference values (1.6.2007):
http://www.phppo.cdc.gov/nccdphp/dnpa/growthcharts/training/modules/module2/text/ad314_statistical.htm & http://www.who.int/childgrowth/standards/en/index.html

Appendix

Table 1 Ethnicity distribution of the sample

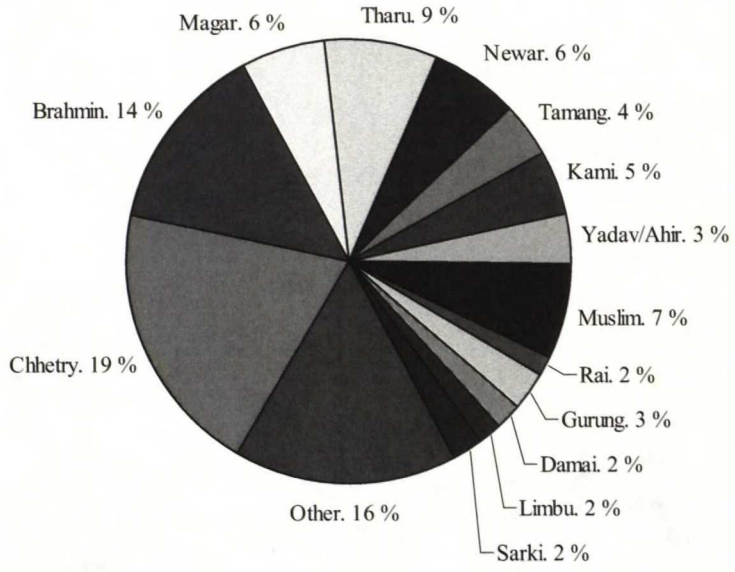


Table 2 Z-score values for mild, moderate and severe malnutrition

Malnutrition Indicator	***Z* < -1.0**	***Z* < -2.0**	***Z* < -3.0**
Height-Age Z-score	Mild stunting	Moderate stunting	Severe stunting
Weight-Age Z-score	Mild underweight	Moderate underweight	Severe underweight
Weight-Height Z-score	Mild wasting	Moderate wasting	Severe wasting

Source: (Lethen, 1996)

Table 3 Expected effects of independent variables

Variable	**Expected effects**
Multiplicative variable	+
Mother's marriage age	+
Birth control knowledge	+
Mothers schooling years	+
Education difference	-
Mother's childbearing age	+
Share of adult goods in total budget	-
Family size	-
Remittances to the mother	+
Distance to nearest shop	-

Table 4 Sample means

Variable	Mean	Std Dev	Min	Max	N
Weight for age	-2.35	1.60	-11.25	5.93	1599
Height foe age	-2.04	1.64	-13.63	6.14	1592
Weight for height	-1.11	1.64	-16.32	4.07	1501
BMI for over 2 year-olds	15.62	1.79	10.92	32.25	665
Child is only breastfed (dummy=1, if yes)	0.78	0.41	0.00	1.00	1600
Child has a birth certificate (1 yes 2 no)	1.68	0.47	1.00	2.00	1600
Child's age in months	20.79	11.99	0.07	48.49	1600
Child is male (dummy=1, if yes)	0.52	0.50	0.00	1.00	1600
Child is immunized (dummy=1, if yes)	0.76	0.43	0.00	1.00	1596
Child has a chronic illness (dummy=1, if yes)	0.01	0.09	0.00	1.00	1600
Child was ill recently (dummy=1, if yes)	0.35	0.48	0.00	1.00	1600
Child was /is breastfed (dummy=1, if yes)	0.94	0.23	0.00	1.00	1600
Birth order of the child	6.44	2.87	2.00	22.00	1600
Height	74.48	10.60	32.00	100.90	1593
Weight	8.81	3.24	1.60	90.60	1599
Baby milk share of expenditures	0.00	0.02	0.00	0.40	1600
Share of adult goods of total foods	0.03	0.06	0.00	0.72	1599
Mother's age at marriage	16.87	3.60	0.00	33.00	1579
Mother knows birthcontrol (dummy=1, if yes)	0.56	0.50	0.00	1.00	1592
Mother works for wage (dummy=1, if yes)	0.09	0.28	0.00	1.00	1600
Education differential in years	-2.59	3.55	-15.00	10.00	1346
Distance to local shop	0.68	2.46	0.00	48.00	1581
Mother's age/father's age	0.87	0.11	0.37	1.33	1432
Remittances to mothers in 1000 Rs	0.22	2.39	0.00	50.00	1600
Mother's age	27.40	6.46	15.00	51.00	1589
Mother's age at delivery	25.67	6.41	12.61	48.81	1589
Mother's age at delivery of first born child	19.59	3.76	6.00	56.00	1578
Mother was ill recently (dummy=1, if yes)	0.26	0.44	0.00	1.00	1587
Mother has chronic illness (dummy=1, if yes)	0.06	0.23	0.00	1.00	1587
Mother is literate (dummy=1, if yes)	0.20	0.40	0.00	1.00	1430
Mother's highest level of schooling	1.31	3.07	0.00	15.00	1424
Mother is married (dummy=1, if yes)	0.99	0.10	0.00	1.00	1589
Father's age	31.85	8.24	16.00	75.00	1432
Father literate (dummy=1, if yes)	0.60	0.49	0.00	1.00	1380
Father's schooling level	3.87	4.38	0.00	21.00	1351
HH animals value in Rs	27047	33568	0.00	426000	1600
Natural logarithm of house value	9.63	3.02	0.00	15.83	1600
HH ownsland (dummy=1, if yes)	0.82	0.38	0.00	1.00	1600
HH is poor (dummy=1, if yes)	0.47	0.50	0.00	1.00	1600
Log of food consumed total	7.90	0.69	5.70	10.65	1384
HH is multigenerational (dummy=1, if yes)	0.33	0.47	0.00	1.00	1600
HH is Hindu (dummy=1, if yes)	0.87	0.34	0.00	1.00	1546
Natural logarithm of electricity value	7.08	1.04	3.91	9.80	249
Water is piped to house (dummy=1, if yes)	0.11	0.32	0.00	1.00	1600
No sanitation (dummy=1, if yes)	0.87	0.34	0.00	1.00	1600
No garbage disposal (dummy=1, if yes)	0.97	0.18	0.00	1.00	1600
No toilet (dummy=1, if yes)	0.76	0.43	0.00	1.00	1600
Distance to health post	1.35	3.55	0.00	72.00	1596
Distance to a paved road	11.20	24.47	0.00	168.00	1590
Mountains (dummy=1, if yes)	0.14	0.35	0.00	1.00	1600
Urban hills (dummy=1, if yes)	0.10	0.30	0.00	1.00	1600
Rural hills (dummy=1, if yes)	0.35	0.48	0.00	1.00	1600
Terai (dummy=1, if yes)	0.41	0.49	0.00	1.00	1600
Family has migrated (dummy=1, if yes)	0.11	0.32	0.00	1.00	1600
HH is Cchetry (dummy=1, if yes)	0.19	0.39	0.00	1.00	1600
HH is Brahmin (dummy=1, if yes)	0.14	0.34	0.00	1.00	1600
HH is Magar (dummy=1, if yes)	0.06	0.23	0.00	1.00	1600
HH is Tharu (dummy=1, if yes)	0.08	0.28	0.00	1.00	1600
HH is Newar (dummy=1, if yes)	0.06	0.24	0.00	1.00	1600
HH is Tamang (dummy=1, if yes)	0.04	0.19	0.00	1.00	1600
HH is Kami (dummy=1, if yes)	0.05	0.21	0.00	1.00	1600
HH is Yadav/Ahir (dummy=1, if yes)	0.03	0.18	0.00	1.00	1600
HH is Muslim (dummy=1, if yes)	0.07	0.25	0.00	1.00	1600
HH is Rai (dummy=1, if yes)	0.02	0.12	0.00	1.00	1600
HH is Gurung (dummy=1, if yes)	0.03	0.16	0.00	1.00	1600
HH is Damai (dummy=1, if yes)	0.02	0.13	0.00	1.00	1600
HH is Limbu (dummy=1, if yes)	0.02	0.13	0.00	1.00	1600
HH is Sarki (dummy=1, if yes)	0.02	0.14	0.00	1.00	1600
HH other ethnicity (dummy=1, if yes)	0.16	0.36	0.00	1.00	1600

Table 5 Means: women marriage age over 20 years and total sample means

VARIABLE	Mean	Mean all	VARIABLE	Mean	Mean all
WAZ	-2.10	-2.35	Natural logarithm of purchases	6.80	6.62
HAZ	-1.94	-2.04	Multigenerational	35 %	33 %
WHZ	-0.86	-1.11	Natural logarithm of family size	1.78	1.87
Age at marriage	23.41	16.87	Mountains	17 %	14 %
Mother aware of birth control	49 %	56 %	Urban Hills	18 %	10 %
Education differential in years	-2.0	-2.6	Rural Hills	41 %	35 %
Education ratio (mother/father)	0.71	0.63	Terai	23 %	41 %
Age differential ratio	0.91	0.87	Cchetry	19 %	19 %
Age differential in years	-4.0	-4.4	Newar	13 %	6 %
Mother's age at delivery	29	26	Tamang	4 %	4 %
Mother's age at first born	24	20	Rai	4 %	2 %
Mother is literate	27 %	20 %	Gurung	5 %	3 %
Mother's level of schooling	2.33	1.31	Limbu	4 %	2 %
Child is male	47 %	52 %	Sarki	2 %	2 %

Table 6 Pearson correlation coefficients in significance order upon birth controlling knowledge

VARIABLE	Correlation coefficients	VARIABLE	Correlation coefficients
Weight-age z-score	0.16	HH has no sanitation	-0.15
Height-age z-score	0.13	HH has no garbage disposal	-0.16
Multiplicative variable	0.16	HH has no toilet	-0.21
Mother's age at birth	-0.19	Distance to health post	-0.12
Education gap in years	-0.18	Mountains	-0.12
Mother's schooling	0.26	Urban hills	0.26
Mother's age	-0.19	Newar	0.12
Mother is literate	0.26	Muslim	-0.10
Child is immunized	0.18	Distance to shop	-0.09
Child was ill	0.10	Limbu	-0.09
Log of expenditures	0.18	Cchetry	-0.09
HH is of poorer half	-0.22	Brahmin	0.09
HH has piped water	0.20	Weight-height z-score	0.07

Table 7 Pearson correlation coefficients in significance order upon the age difference in years

VARIABLE	Coefficient
HH is multigenerational	0.18
Multiplicative variable	0.16
Education gap in years	-0.16
Education difference ratio	-0.15
Mother's age at first child	0.11
Logarithm of family size	0.09
HH has migrated	-0.08
Tharu	0.08
Value of livestock	0.08

Table 8 Significant Pearson correlation coefficients in significance order upon mother working for wage

VARIABLE	Coefficient
Other ethnic group	0.19
Region of Terai	0.16
Sarki	0.14
Education gap in years	0.11
Livestock value	-0.11
Cchetry	-0.11
Mom is literate	-0.10
Mother's education level	-0.10
Multiplicative variable	-0.10
HH has no sanitation	0.09
Region Rural Hills	-0.09
HH has no toilet	0.08
Weight-height z-score	-0.08
Child is only breastfed	0.08
Weight-age z-score	-0.07
Water is piped house	-0.07
HH is of poorer half	0.07

Table 9 Significant Pearson correlation coefficients for adult goods expenditure shares

Variable	**Coefficient**
Tamang	0,22
Ln of expenditures	0,18
HH is poor	-0,12
Terai	-0,12
Urban hills	0,11
Livestock	-0,11
Rural hills	0,10
Child was ill	0,10
Mother was ill	0,10
Other ethnic group	-0,08
Weight for height	0,08
Age at marriage	0,08
Sarki	0,08
Weight for age	0,08

Table 10 OLS estimates for weight-for age z-scores

VARIABLE	WAZ				MALES WAZ				FEMALES WAZ			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat
Mother's status												
Multiplicative	0,74	2.7 ***	0,73	2.65 **	0,78	2.32**	0,78	2.32 **	0,64	1,36	0,62	1,33
Mother's age at child birth	0,02	2.01 **	0,01	1.85 *	0,01	1,23	0,01	1,14	0,02	1.65 *	0,02	1,57
Mother's age at marriage	0,01	0,96	0,01	1,12	-0,02	-1,16	-0,02	-1,02	0,04	2.17 **	0,04	2.22 **
Birth control aware	0,19	2.1 **	0,21	2.34 **	0,37	2.97 ***	0,39	3.18 ***	0,01	0,08	0,03	0,19
Mother works for wage	-0,33	-2.15 **	-0,35	-2.31 **	-0,46	-2.3 **	-0,48	-2.44 **	-0,28	-1.16	-0,30	-1.24
Education difference ratio	0,12	1,45	0,15	1.99 *	0,09	0,95	0,12	1,41	0,12	0,76	0,15	1,00
Distance to a local shop	0,01	0,69	0,01	0,67	0,02	0,70	0,02	0,70	0,00	-0,06	0,00	-0,08
Adult goods	0,13	0,51	0,13	0,52	-0,13	-0,36	-0,12	-0,35	0,35	0,95	0,35	0,96
Age differential in years	-0,01	-0,67	-0,01	-0,60	0,00	-0,14	0,00	-0,20	0,00	-0,04	0,00	0,07
Remittances to mothers	0,11	0,71	0,10	0,68	0,03	0,11	0,02	0,09	0,16	0,80	0,15	0,77
Mother's characteristics												
Mother's schooling level	0,03	1,55			0,03	1,11			0,02	0,80		
Mother ill lately	-0,08	-0,78	-0,07	-0,70	-0,03	-0,25	-0,03	-0,23	-0,09	-0,63	-0,09	-0,59
Mother chronically ill	-0,30	-1.73 *	-0,30	-1.76 *	-0,72	-2.86 ***	-0,72	-2.88 ***	0,07	0,30	0,07	0,29
Child characteristics												
Age 7-12 months	-1,30	-8.76 ***	-1,30	-8.79 ***	-1,43	-7.19 ***	-1,43	-7.21 ***	-1,22	-5.49 ***	-1,23	-5.53 ***
13-24 months	-1,86	-14.7 ***	-1,86	-14.7 ***	-1,70	-10 ***	-1,70	-10. 0***	-2,01	-10.6 ***	-2,02	-10.6 ***
25-45 months	-0,99	-7.1 ***	-0,99	-7.1 ***	-0,91	-4.82 ***	-0,91	-4.83 ***	-1,10	-5.28 ***	-1,10	-5.28 ***
Child is male	0,06	0,69	0,06	0,68								
Child is immunized	0,02	0,23	0,03	0,29	-0,02	-0,17	-0,02	-0,15	0,03	0,19	0,03	0,23
Child chronically ill	-1,69	-4.01 ***	-1,67	-3.98 ***	-0,18	-0,30	-0,16	-0,27	-3,29	-5.51 ***	-3,29	-5.51 ***
Child was recently ill	-0,11	-1,20	-0,11	-1,16	-0,03	-0,27	-0,03	-0,25	-0,12	-0,82	-0,11	-0,78
0-6 months not breasfed	1,95	1.95 *	1,92	1.92 *	2,08	1,46	2,06	1,45	1,42	0,95	1,38	0,92
13-24 months not bfed	-0,46	-1,12	-0,49	-1,18	0,07	0,13	0,05	0,08	-0,60	-0,96	-0,62	-0,99
25-45 months only bfed	-0,60	-4.49 ***	-0,61	-4.61 ***	-0,39	-2.23 **	-0,41	-2.3 **	-0,86	-4.19 ***	-0,87	-4.28 ***
Household characteristics												
Ln family size	-0,52	-2.82 ***	-0,53	-2.89 ***	-0,19	-0,78	-0,20	-0,83	-0,85	-2.97 ***	-0,86	-3.01 ***
Multi-generational	0,17	1,49	0,18	1,63	0,06	0,44	0,08	0,58	0,34	1.92 *	0,35	1.98 *
HH is poor	-0,25	-2.54 **	-0,26	-2.63 **	-0,45	-3.42 ***	-0,46	-3.53 ***	0,03	0,20	0,03	0,18
Value of livestock	0,00	1.88 *	0,00	1.85 *	0,00	1,09	0,00	1,04	0,00	1,02	0,00	1,00
Ln house value	0,02	1,55	0,03	1.81 *	-0,01	-0,46	0,00	-0,21	0,05	2.15 **	0,05	2.22 **
Ln of expenditures	-0,01	-0,22	0,00	-0,02	-0,02	-0,26	-0,01	-0,18	0,00	0,02	0,01	0,16
Water piped to house	0,23	1,28	0,29	1.68 *	0,34	1,51	0,40	1.8 *	0,12	0,42	0,17	0,60
No sanitation	-0,02	-0,15	-0,03	-0,19	0,10	0,49	0,09	0,44	-0,29	-1,12	-0,29	-1.12
No garbage disposal	-0,18	-0,67	-0,19	-0,70	-0,09	-0,28	-0,08	-0,26	-0,30	-0,67	-0,32	-0,72
No toilet	-0,29	-2.34 **	-0,33	-2.65 **	-0,28	-1,59	-0,31	-1.82 *	-0,33	-1.79 *	-0,36	-1.97 *
Health post distance hrs	0,02	1.71 *	0,02	1.75 *	0,01	0,44	0,01	0,45	0,01	1,09	0,01	-1.12
Regional characteristics												
Mountains	0,01	0,08	0,01	0,04	-0,02	-0,08	-0,02	-0,09	0,13	0,65	0,12	0,61
HH is on the urban hills	0,42	1.89 *	0,45	2.05 **	0,15	0,51	0,18	0,62	0,53	1,61	0,56	1.69 *
HH is on the Terai	-0,04	-0,32	0,00	-0,03	-0,27	-1,56	-0,24	-1,37	0,24	1,18	0,27	1,33
HH has migrated	-0,03	-0,19	-0,02	-0,15	-0,13	-0,71	-0,12	-0,66	-0,04	-0,17	-0,03	-0,15
Cchetry	0,03	0,17	0,06	0,35	-0,13	-0,63	-0,11	-0,53	0,21	0,83	0,24	0,97
Brahmin	-0,08	-0,48	-0,03	-0,17	-0,52	-2.24 **	-0,47	-2.08 **	0,37	1,45	0,42	1.69 *
Magar	0,39	1.89 *	0,41	2.03 **	-0,04	-0,14	-0,01	-0,05	0,88	2.77 **	0,91	2.85 ***
Tharu	0,20	1,16	0,19	1,10	-0,03	-0,12	-0,04	-0,18	0,44	1,61	0,43	1,60
Newar	0,33	1,56	0,35	1,63	0,66	2.4 **	0,68	2.47 **	0,24	0,74	0,25	0,77
Tamang	0,58	2.58 **	0,58	2.55 **	0,50	1.76 *	0,50	1.78 *	0,71	1.96 *	0,69	1.92 *
Kami	-0,10	-0,42	-0,08	-0,33	-0,29	-0,96	-0,26	-0,88	0,30	0,84	0,32	0,89
Yadav or Ahir	-0,43	-1.84 *	-0,46	-1.97 **	-0,29	-1,05	-0,32	-1,15	-0,94	-2.17 **	-0,96	-2.23 **
Muslim	-0,12	-0,68	-0,14	-0,77	-0,08	-0,30	-0,09	-0,37	-0,17	-0,66	-0,18	-0,70
Rai	0,73	2.25 **	0,75	2.31 **	0,27	0,65	0,27	0,65	1,28	2.56 **	1,31	2.63 **
Gurung	-0,04	-0,15	-0,02	-0,06	-0,15	-0,41	-0,14	-0,39	0,24	0,55	0,27	0,61
Damai	-0,22	-0,67	-0,21	-0,65	-0,34	-0,70	-0,36	-0,74	-0,23	-0,51	-0,22	-0,47
Limbu	-0,02	-0,08	-0,01	-0,02	0,38	0,91	0,41	0,97	-0,16	-0,38	-0,15	-0,36
Sarki	0,11	0,40	0,12	0,43	0,18	0,46	0,21	0,52	0,18	0,47	0,18	0,47
Intercept	-0,91	-1,43	-0,98	-1,55	-0,47	-0,57	-0,56	-0,68	-1,10	-1,12	-1,14	-1,16
N	1173		1173		601		601		572		572	

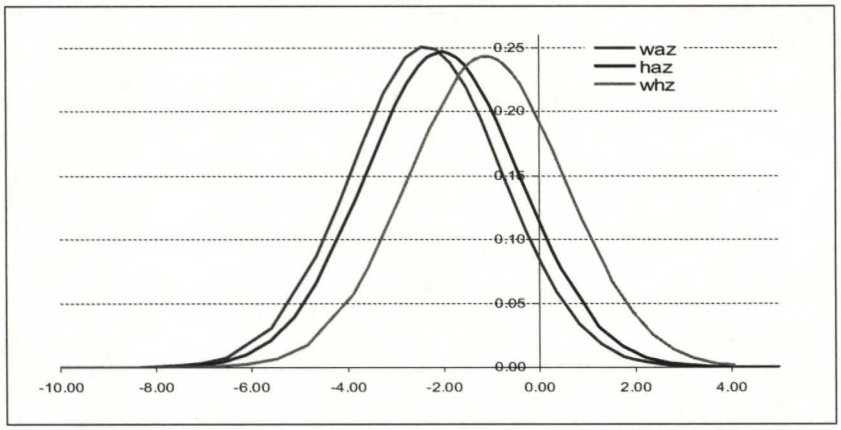
Table 11 OLS estimates for height-for age z-scores

VARIABLE	HAZ				MALES HAZ				FEMALES HAZ			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat
Mother's status												
Multiplicative	0.86	2.94 ***	0.85	2.9 ***	1.06	2.66 **	1.06	2.64 **	0.57	1.25	0.57	1.26
Mother's age at child birth	0.01	1.42	0.01	1.29	0.01	0.52	0.00	0.34	0.02	1.78 *	0.02	1.81 *
Mother's age at marriage	0.00	0.02	0.00	0.15	-0.03	-1.49	-0.03	-1.25	0.03	1.55	0.03	1.55
Birth control aware	0.13	1.30	0.14	1.49	0.35	2.37 **	0.39	2.67 **	-0.15	-1.14	-0.15	-1.17
Mother works for wage	-0.18	-1.09	-0.20	-1.23	-0.38	-1.58	-0.43	-1.82 *	0.03	0.12	0.03	0.13
Education difference ratio	0.05	0.56	0.08	0.97	0.00	-0.04	0.06	0.61	0.06	0.41	0.06	0.39
Distance to a local shop	0.01	0.34	0.01	0.32	0.01	0.41	0.01	0.41	-0.01	-0.28	-0.01	-0.28
Adult goods	-0.43	-1.60	-0.43	-1.60	-0.70	-1.7 *	-0.70	-1.69 *	-0.11	-0.31	-0.11	-0.31
Age differential in years	0.00	0.03	0.00	0.08	0.01	0.52	0.01	0.43	0.01	0.54	0.01	0.52
Remittances to mothers	0.06	0.36	0.05	0.34	-0.21	-0.70	-0.21	-0.71	0.15	0.77	0.15	0.78
Mother's characteristics												
Mother's schooling level	0.03	1.26			0.06	1.8 *			0.00	-0.19		
Mother ill lately	-0.21	-2.06 **	-0.21	-1.99 **	-0.13	-0.84	-0.13	-0.80	-0.23	-1.58	-0.23	-1.59
Mother chronically ill	-0.36	-1.94 *	-0.36	-1.97 **	-0.80	-2.72 **	-0.81	-2.75 **	-0.11	-0.45	-0.11	-0.45
Child characteristics												
Age 7-12 months	-1.04	-6.59 ***	-1.05	-6.61 ***	-1.19	-5.05 ***	-1.20	-5.08 ***	-0.89	-4.08 ***	-0.88	-4.08 ***
13-24 months	-1.44	-10.6 ***	-1.44	-10.6 ***	-1.52	-7.57 ***	-1.52	-7.58 ***	-1.33	-7.15 ***	-1.33	-7.16 ***
25-45 months	-1.58	-10.6 ***	-1.58	-10.6 ***	-1.63	-7.35 ***	-1.64	-7.36 ***	-1.51	-7.49 ***	-1.51	-7.5 ***
Child is male	-0.24	-2.7 **	-0.24	-2.71 **								
Child is immunized	0.05	0.47	0.06	0.52	0.22	1.31	0.22	1.35	0.00	-0.03	0.00	-0.03
Child chronically ill	-0.91	-2.03 **	-0.90	-2.01 **	-0.45	-0.65	-0.42	-0.60	-1.39	-2.4 **	-1.39	-2.4 **
Child was recently ill	0.31	3.1 ***	0.31	3.13 ***	0.45	3.18 ***	0.45	3.19 ***	0.18	1.29	0.18	1.29
0-6 months not breasfed	1.26	1.18	1.24	1.16	2.07	1.23	2.04	1.21	0.01	0.00	0.01	0.01
13-24 months not bfed	-0.41	-0.94	-0.44	-1.00	0.15	0.23	0.10	0.15	-0.62	-1.03	-0.62	-1.02
25-45 months only bfed	-0.30	-2.13 **	-0.32	-2.23 **	0.04	0.19	0.02	0.08	-0.74	-3.73 ***	-0.74	-3.74 ***
Household characteristics												
Ln family size	0.01	0.05	0.00	-0.01	0.16	0.57	0.14	0.50	-0.16	-0.58	-0.16	-0.58
Multi-generational	-0.08	-0.62	-0.06	-0.51	-0.22	-1.28	-0.18	-1.06	0.15	0.90	0.15	0.90
HH is poor	-0.31	-2.9 ***	-0.31	-2.98 ***	-0.34	-2.17 **	-0.37	-2.35 **	-0.24	-1.62	-0.24	-1.62
Value of livestock	0.00	0.95	0.00	0.93	0.00	1.03	0.00	0.94	0.00	-0.38	0.00	-0.37
Ln house value	0.00	0.10	0.00	0.29	-0.01	-0.60	0.00	-0.21	0.01	0.64	0.01	0.64
Ln of expenditures	-0.05	-0.91	-0.04	-0.75	-0.06	-0.72	-0.05	-0.60	-0.05	-0.69	-0.06	-0.73
Water piped to house	0.34	1.79 *	0.40	2.12 **	0.32	1.17	0.42	1.58	0.42	1.52	0.41	1.53
No sanitation	0.07	0.38	0.06	0.35	0.08	0.32	0.06	0.23	0.02	0.07	0.02	0.07
No garbage disposal	-0.27	-0.97	-0.28	-1.00	-0.35	-0.91	-0.34	-0.88	-0.29	-0.67	-0.28	-0.66
No toilet	-0.15	-1.09	-0.17	-1.32	-0.22	-1.08	-0.29	-1.43	-0.07	-0.40	-0.07	-0.38
Health post distance hrs	0.01	1.12	0.01	1.16	0.01	0.36	0.01	0.39	0.01	0.65	0.01	0.64
Regional characteristics												
Mountains	0.04	0.27	0.03	0.23	0.15	0.68	0.14	0.66	0.06	0.33	0.06	0.33
HH is on the urban hills	0.24	1.02	0.27	1.14	-0.03	-0.09	0.03	0.10	0.30	0.94	0.30	0.93
HH is on the Terai	0.21	1.45	0.24	1.72 *	0.10	0.47	0.17	0.81	0.29	1.45	0.29	1.45
HH has migrated	0.00	-0.02	0.00	0.00	0.00	0.01	0.01	0.06	-0.11	-0.52	-0.11	-0.52
Cchetry	0.19	1.11	0.22	1.27	0.18	0.71	0.21	0.86	0.22	0.90	0.21	0.89
Brahmin	-0.02	-0.09	0.03	0.16	-0.30	-1.10	-0.22	-0.83	0.33	1.33	0.32	1.34
Magar	0.16	0.75	0.19	0.85	-0.16	-0.50	-0.11	-0.35	0.52	1.66 *	0.51	1.66 *
Tharu	0.28	1.49	0.27	1.44	0.25	0.95	0.23	0.85	0.24	0.91	0.24	0.91
Newar	0.08	0.35	0.09	0.40	0.20	0.60	0.23	0.70	0.10	0.31	0.09	0.30
Tamang	0.56	2.33 **	0.56	2.31 **	0.68	2.02 **	0.69	2.04 **	0.43	1.22	0.43	1.23
Kami	0.03	0.13	0.05	0.20	0.06	0.17	0.11	0.30	0.20	0.57	0.19	0.56
Yadav or Ahir	-0.53	-2.1 **	-0.55	-2.21 **	-0.44	-1.36	-0.49	-1.51	-0.66	-1.57	-0.66	-1.57
Muslim	0.02	0.11	0.01	0.04	0.15	0.51	0.12	0.40	-0.05	-0.21	-0.05	-0.20
Rai	0.02	0.05	0.03	0.09	0.13	0.26	0.12	0.25	-0.18	-0.38	-0.19	-0.39
Gurung	-0.44	-1.44	-0.42	-1.37	-0.16	-0.36	-0.15	-0.33	-0.63	-1.47	-0.64	-1.48
Damai	0.22	0.62	0.22	0.63	0.03	0.05	0.00	-0.01	0.30	0.67	0.29	0.66
Limbu	0.01	0.03	0.02	0.07	1.00	2.01 **	1.05	2.11 **	-0.72	-1.73 *	-0.72	-1.73 *
Sarki	0.23	0.77	0.23	0.80	0.21	0.43	0.25	0.53	0.11	0.29	0.11	0.29
Intercept	-0.72	-1.06	-0.77	-1.14	-0.44	-0.45	-0.58	-0.60	-1.06	-1.11	-1.05	-1.10
N	1169		1169		599		599		570		570	

Table 12 OLS estimates for weight-for-height z-scores

VARIABLE	WHZ				MALES WHZ				FEMALES WHZ			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat	Coeff	t stat
Mother's status												
Multiplicative	0.34	1.07	0.32	1.02	0.15	0.36	0.15	0.36	0.45	0.88	0.42	0.82
Mother's age at child birth	0.00	0.44	0.00	0.31	0.01	1.00	0.01	0.99	-0.01	-0.64	-0.01	-0.77
Mother's age at marriage	0.02	1.38	0.02	1.52	0.01	0.43	0.01	0.46	0.03	1.57	0.03	1.63
Birth control aware	0.10	0.93	0.12	1.14	0.18	1.13	0.19	1.17	0.07	0.48	0.10	0.66
Mother works for wage	-0.27	-1.49	-0.30	-1.64	-0.37	-1.42	-0.38	-1.45	-0.29	-1.05	-0.33	-1.19
Education difference ratio	0.13	1.45	0.17	1.94 *	0.17	1.47	0.18	1.64 *	0.07	0.44	0.13	0.81
Distance to a local shop	0.01	0.56	0.01	0.55	0.01	0.29	0.01	0.29	0.01	0.42	0.01	0.38
Adult goods	0.58	1.93 *	0.58	1.93 *	0.45	0.93	0.45	0.93	0.58	1.48	0.58	1.47
Age differential in years	-0.01	-0.86	-0.01	-0.80	-0.01	-0.76	-0.01	-0.77	-0.01	-0.37	0.00	-0.19
Remittances to mothers	0.08	0.45	0.07	0.42	0.36	1.16	0.36	1.16	0.00	0.01	-0.01	-0.04
Mother's characteristics												
Mother's schooling level	0.03	1.39			0.01	0.21			0.04	1.32		
Mother ill lately	0.05	0.45	0.06	0.52	0.03	0.18	0.03	0.18	0.04	0.27	0.05	0.34
Mother chronically ill	-0.11	-0.54	-0.11	-0.56	-0.25	-0.79	-0.25	-0.80	0.14	0.52	0.13	0.49
Child characteristics												
Age 7-12 months	-0.22	-1.28	-0.22	-1.31	-0.40	-1.59	-0.40	-1.60	-0.18	-0.75	-0.19	-0.81
13-24 months	-0.54	-3.74 ***	-0.55	-3.77 ***	-0.52	-2.43 **	-0.52	-2.44 **	-0.58	-2.83 ***	-0.59	-2.89 ***
25-45 months	-0.04	-0.24	-0.04	-0.25	-0.02	-0.07	-0.02	-0.07	-0.11	-0.48	-0.11	-0.48
Child is male	-0.02	-0.17	-0.02	-0.18								
Child is immunized	-0.02	-0.15	-0.01	-0.09	-0.28	-1.58	-0.28	-1.57	0.08	0.51	0.10	0.59
Child chronically ill	-0.34	-0.61	-0.34	-0.60	0.92	1.12	0.93	1.13	-1.91	-2.44**	-1.94	-2.47 **
Child was recently ill	-0.38	-3.58 ***	-0.38	-3.55 ***	-0.40	-2.66 **	-0.40	-2.66 **	-0.30	-1.87 *	-0.29	-1.82 *
0-6 months not breasfed	1.24	1.10	1.21	1.07	0.50	0.28	0.50	0.28	1.78	1.13	1.70	1.07
13-24 months not bfed	-0.30	-0.65	-0.33	-0.72	-0.05	-0.08	-0.06	-0.09	-0.45	-0.67	-0.48	-0.72
25-45 months only bfed	-0.30	-1.86 *	-0.31	-1.97 **	-0.42	-1.82 *	-0.42	-1.84 *	-0.15	-0.62	-0.17	-0.75
Household characteristics												
Ln family size	-0.55	-2.6 **	-0.57	-2.69 ***	-0.51	-1.67	-0.51	-1.68 *	-0.61	-1.94 *	-0.64	-2.03 **
Multi-generational	0.23	1.71 *	0.24	1.85 *	0.37	2.00 **	0.38	2.04 **	0.07	0.38	0.09	0.49
HH is poor	-0.04	-0.39	-0.05	-0.46	-0.31	-1.86 *	-0.32	-1.89 *	0.27	1.62	0.27	1.61
Value of livestock	0.00	1.04	0.00	1.00	0.00	0.07	0.00	0.06	0.00	1.18	0.00	1.15
Ln house value	0.02	1.21	0.03	1.45	0.00	-0.19	0.00	-0.14	0.04	1.52	0.04	1.64
Ln of expenditures	0.04	0.68	0.05	0.87	0.02	0.22	0.02	0.24	0.07	0.74	0.09	1.01
Water piped to house	-0.11	-0.53	-0.04	-0.21	0.12	0.40	0.13	0.46	-0.36	-1.16	-0.27	-0.88
No sanitation	-0.17	-0.91	-0.17	-0.93	-0.05	-0.18	-0.05	-0.19	-0.41	-1.42	-0.41	-1.42
No garbage disposal	-0.09	-0.30	-0.10	-0.32	0.04	0.10	0.04	0.10	-0.13	-0.28	-0.17	-0.36
No toilet	-0.28	-1.9 *	-0.31	-2.15 **	-0.15	-0.67	-0.16	-0.71	-0.40	-1.94	-0.44	-2.18
Health post distance hrs	0.01	1.04	0.01	1.08	0.01	0.34	0.01	0.34	0.01	0.69	0.01	0.74
Regional characteristics												
Mountains	0.05	0.34	0.05	0.31	-0.09	-0.37	-0.09	-0.37	0.18	0.80	0.17	0.75
HH is on the urban hills	0.16	0.63	0.20	0.78	0.04	0.12	0.05	0.14	0.36	1.02	0.41	1.14
HH is on the Terai	-0.36	-2.31 **	-0.32	-2.09 **	-0.54	-2.41 **	-0.53	-2.41 **	-0.15	-0.64	-0.09	-0.41
HH has migrated	-0.28	-1.75 *	-0.28	-1.73 *	-0.50	-2.17 **	-0.49	-2.16 **	-0.03	-0.13	-0.03	-0.11
Cchetry	-0.21	-1.11	-0.17	-0.95	-0.48	-1.78 *	-0.47	-1.77 *	0.06	0.21	0.11	0.43
Brahmin	-0.38	-1.92 **	-0.32	-1.68 *	-0.79	-2.69 ***	-0.78	-2.69 ***	-0.01	-0.02	0.08	0.30
Magar	0.32	1.33	0.34	1.45	0.16	0.48	0.17	0.50	0.53	1.53	0.57	1.64
Tharu	0.09	0.44	0.08	0.40	-0.22	-0.76	-0.22	-0.77	0.44	1.46	0.43	1.43
Newar	0.33	1.35	0.35	1.42	0.46	1.31	0.46	1.33	0.31	0.86	0.33	0.91
Tamang	0.16	0.63	0.16	0.60	-0.11	-0.31	-0.11	-0.31	0.47	1.21	0.44	1.14
Kami	-0.20	-0.76	-0.18	-0.69	-0.54	-1.45	-0.54	-1.44	0.17	0.45	0.20	0.52
Yadav or Ahir	0.09	0.34	0.06	0.23	0.27	0.75	0.26	0.73	-0.52	-1.13	-0.56	-1.23
Muslim	-0.28	-1.30	-0.29	-1.37	-0.36	-1.12	-0.36	-1.14	-0.17	-0.58	-0.19	-0.64
Rai	1.02	2.71 **	1.04	2.77 ***	0.29	0.56	0.29	0.56	1.85	3.32***	1.92	3.45 ***
Gurung	0.18	0.49	0.20	0.56	-0.28	-0.59	-0.28	-0.59	0.79	1.34	0.86	1.46
Damai	-0.65	-1.53	-0.65	-1.52	-0.50	-0.73	-0.50	-0.73	-0.75	-1.36	-0.74	-1.34
Limbu	-0.04	-0.11	-0.02	-0.06	-0.77	-1.46	-0.76	-1.46	0.77	1.62	0.78	1.64
Sarki	-0.13	-0.38	-0.13	-0.39	0.05	0.09	0.05	0.09	0.07	0.16	0.06	0.15
Intercept	-0.36	-0.48	-0.44	-0.59	0.21	0.20	0.19	0.18	-0.70	-0.64	-0.77	-0.71
N	1100		1100		569		569		531		531	

Graph 1 Z-score distributions



Sample	**Mean**	**Std Dev**
Boys	-2.13	1.66
Girls	-1.92	1.55

Graph 2 Height-age z-scores distributions samples by gender

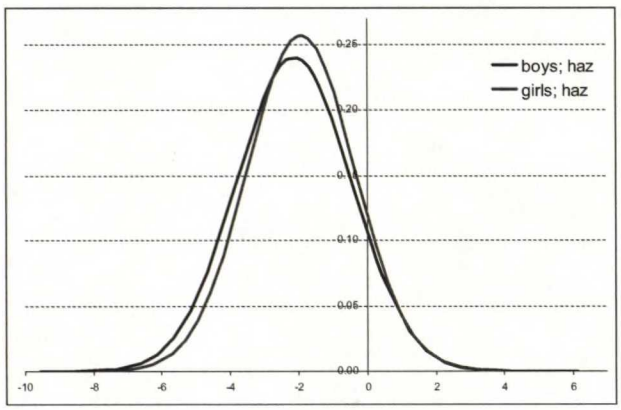


Table 13 Pearson correlation: selected variables

VARIABLES	No toilet Coefficient
Region urban hills	-0.47
Mother's schooling level	-0.45
HH has water piped	-0.44
Mom is literate	-0.44
HH has no sanitation	0.42
Logarithm of expenditures	-0.31
No garbage disposal	0.29
HH is poor	0.27
Newar	-0.23
Mother knows birth control	-0.21
Weight-age z-score	-0.21
Region Terai	0.21
Child has a birth certificate	0.19
Mother's age at marriage	-0.18
Brahmin	-0.17
Child is immunized	-0.17
Weight height z-score	-0.16
Height-age z-score	-0.13
Mother's delivery age	0.12
Mother's age	0.11
Other ethnic group	0.11
Distance to health post	0.11
Tharu	0.10
Education gap in years	0.10

Table 14 Significant OLS estimates for child is ill

Variables	Child ill	t stat
Mother was ill	0.27	9.01 ***
Child is 7-12 months	0.22	4.53 ***
Mother knows birth control	0.11	3.65 ***
Child is 13-24 months	0.14	3.51 ***
HH has migrated	-0.14	-3.11 ***
HH has no garbage disposal	0.25	2.97 ***
Magar	0.17	2.55 **
Ln of family size	-0.15	-2.48 **
Child is male	0.06	2.39 **
HH has no toilet	-0.09	-2.11 **
Child is 25-45 months	0.09	2.06 **
Muslim	0.10	1.72 *
HH is on the Terai-plain	0.07	1.71 *
Child is immunized	0.05	1.68 *

WOMEN'S STATUS AND CHILD LABOUR IN NEPAL

1. Introduction

According to UNICEF, 218 million children are engaged in child labour worldwide. Over 58 per cent of the figure comes from the Asian and Pacific regions. Child labour is often hard and hazardous to a child's physical, mental and moral wellbeing and it is found to perpetuate poverty (e.g. Wahba, 2000). The research on child labour often employs household decision-making models. Recent studies have brought evidence, that the balance of power between spouses makes it impossible to view the household as a single unit (Basu, 2004). Moreover the household consumption patterns are found to differ depending on who takes the decisions and who earns the income (e.g. Udry, 1996; Browning et al., 1994). Basu (2004) noted that women show stronger preference for children's wellbeing and are seen as more sensitive to the cost of child labour than men. Duflo in *Gender Equality in Development* (2005) stated that children are healthier in families where the woman has bargaining power. Thus this essay examines the effects of mother's intra-family status on child labour[21] and school attendance using the Nepal Living Standards Survey data (2003-2004).

Albeit it is widely acknowledged that the main cause of child labour is parental poverty and that concentrating on economic development reduces child labour most effectively, the mechanisms to alleviate child labour are not straightforward (Basu and Van, 1998). In reality, child labour persists with a host of interrelated problems such as unskilled adult labour force, poor and exploitative work conditions and gender bias. In some previous models that take children only as assets with no bargaining power, child labour can be decreased by constraining parents' choices by public policies and regulation (Drusilla et al. 2003). Another set of models supposes that parents are altruistic towards their offspring, but adult labour markets have rigidities, which drive child labour (Basu, 1999). A household chooses child labour, if the returns to education are not sufficient to compensate families with the lost income on schooling (Drusilla et al. 2003). Yet, the option for child labour is not always school attendance, but being idle. Children's education is a luxury good in the sense that a poor family begins consuming it as soon as the household income rises sufficiently, taking into consideration the expected future utility of schooling (Basu and Van, 1998). However the expected costs and returns to education in the future labour market with respect to child

[21] Child labour is economic activity performed by a person under the age of fifteen

work are difficult to measure (Rosati and Deb, 2004). School fees in public education add up to the cost of education. It very likely contribute to the fact that every third school-aged child in Nepal does not attend school or work (ILO-IPEC, 1996). This may suggest, that many families are wealthy enough not to send children to work, but not quite enough to be able to educate them.

This essay tests the hypothesis of Basu (2004) stating that in a family where the power is evenly balanced between the parents, children will be least likely to work. The econometric approach for doing this utilises a bivariate probit model with two dependent variables; school attendance and working. A set of previously studied indicators is used to characterise the intra-family power relations. Cigno et al. (2001) have found evidence that mother's education level has an effect on children's school attendance. In Vietnam children are less likely to work if parents are educated (Rosati and Tzannatos, 2000). On the other hand, Rosati and Deb (2004) point out, that poorer households with lower schooling may have a greater respect for education than other families, which may affect their propensity to send children to school. Labour income, which is often used in child labour studies, is a tricky indicator for measuring women's bargaining power, since female labour supply function is negatively sloping for low-income districts and positively sloping for high income districts (Dasgupta and Goldar, 2005). Moreover the labour supply decisions are possibly subject to intra-household bargaining, which may cause endogeneity to these estimates. Therefore the non-labour income indicator (remittances) most likely receives more straightforward evidence in the analysis. The mother's characteristics such as a higher marriage age and her ability to control fertility are found to improve a woman's bargaining power (e.g. Jejeebhoy, 1995; Chiappori and Oreffice, 2007). This study finds evidence that the effect of mother's status is essential on children's schooling and working, measured with mother's marriage age, birth controlling awareness and her remittances. Parents' education has a very positive sign for the estimate upon children's schooling. The gender bias can be seen in school participation rates in Nepal; one fourth of school-aged girls were out of school in 2004, whereas the corresponding figure for boys was 15 per cent (UIS). Albeit the number of economically active children by gender is almost equal, girls work almost double the hours relative to boys (NLSS 2). Alas, girls seem to be the first ones to stay home when the relative cost of schooling rises.

Nepal is one of the poorest countries in Asia with one of the highest child labour force participation rates in Asia. The country ratified the ILO child labour convention in 1997 with a minimum working age of 14 years. Nevertheless, one in every three children is still

engaged in child work (Gilligan, 2003). Poverty, inequality and the social mentality have led to low productivity and discontentment in Nepal, which still remains in an unstable state after a decade long civil war. One central constraint in Nepal's economic development has been the inadequate human capital development (UNESCO, 2006).

This essay is organised as follows. Section 2 describes the data and the variables. Section 3 outlines the model. Section 4 presents the results and section 5 concludes.

2. Data and variables

This study examines the Nepal Living Standards Survey 2 data, conducted by the staff of the Central Bureau of Statistics Nepal and World Bank in 2003-2004[22]. The sample size for the total survey is 3912 families. The number of families analysed is 2155, in which the number of children aged 5 to 14 is 4473. No family clustering is done, thus a few children have the same mother in the sample. This may cause a slight bias in the standard deviations and significance levels, but does not affect the estimates. The survey covers a wide range of information on a member, household and community level. Household level information encompasses e.g. family assets, adequacy of consumption and the presence of physical infrastructure. On a member level the data covers demographics, activities, income, migration and education etc. This study does not utilize the data on children away from home[23], because the information concerning their actual use of time, parents, and id-codes, is not complete enough in NLSS 2.

Each child labour study uses a slightly different framework and set of explanatory variables. Here the explanatory variables include the essential child, parent, family, community and the key intra-family status variables. Moreover, the model (outlined in the next section) was tested separately for the key status indicators for both parents to avoid multicollinearity, but more importantly to see the differences in the estimates upon child labour and school attendance. The status variables include both parents' labour hours, incomes, remittances, ages, education levels, mother's marriage age and her awareness of birth control methods. In particular the two aforementioned are expected to have an impact on a woman's intra-family status (as e.g. in Chiappori and Oreffice, 2007; Quisumbing and Hallman, 2006). Remittances are a form of non-labour income, which is found to have an impact on children's wellbeing depending on the receiver in the previous research (e.g. Duflo, 2005). These are represented in 1000's Nepalese Rupees and were calculated by

[22] The collection period of NLSS 2 was a tense and uncertain period of the civil war in Nepal
[23] These children were working, studying or their activity was unknown.

summing up all remittances coming from different donors. Comparing the estimates show how assets depending on the receiver affect child labour and schooling. Labour income can be thought to improve the bargaining power of the person earning the money and is central in determining children's time use in working and studying. The variables were calculated by adding together all separate incomes from different activities and occupations that the parent had done during the preceding 12 months. The payment basis for different activities was either fixed, hourly based or cash or in-kind and these were summed to make up the total value in 1000's of Rupees. However there may be some endogeneity in mothers' indicators, since the total female labour is possibly subject to a preliminary intra-family bargaining. Labour hours in twelve months' time were calculated by adding up all work hours from different activities. A correlation analysis showed that maternal education correlates with less child work and more studies[24]. Parents' education variables are recoded in a manner that being illiterate is one. If the parent is literate, but has no formal education the education code is two. Code three represents one year of completed classes and so forth. The completed SLC has the code 13. The class 12 is coded 14 and a completed Bachelor's degree has the code 15. The code for a completed Master's degree is 17 and for a Doctorate it is 20[25]. A dichotomous variable measures the unemployment of either parent in the model, which could be thought to be a reason for sending children to work. However parental unemployment has received different evidence from Brazil. Parikh and Sadoulet (2005) found that child labour negatively linked to parental unemployment. The inter-spousal age difference, which in some marital bargaining models is found important to wife's bargaining power is tested here as the husband-wife difference in years. Parents' ages in years were also tested separately in the model. Mother's chronic illness is expected to have an impact on the workload left for rest of the family. Household's engagement in self-employment (e.g. family-owned enterprises) has in previous research received significant evidence to have an impact on children's school attendance and child labour (e.g. Canagarajah and Coulombe, 1998). House sale value as a control for wealth is presented in 1000's of Rupees. The data for the hunger variable was collected by asking the household head that: "*Do you consider that you or any member of your family eats too little food to live a healthy and active live?*"[26] The distance to a water source or to school is represented in minutes. The toilet variable is plugged into the model, since having a toilet increases hygiene, which through better health affects a child's ability to participate education or work. Having piped water in the house decreases the time needed in

[24] All correlations of the explanatory variables in the model were checked and found moderate.
[25] Thus the codes represent the completed years of studies + 2.
[26] 26 per cent answered "yes".

carrying water and it may increase the time available for schooling. These amenities are both also proxies for the communal infrastructure and wealth. In rural areas women's status is usually lower in terms such as education, income, work burden and mobility. Mother's intra-family status varies as well according to the ethnic group, religion and caste. In Nepal the ethnic diversity is considerable[27] and a person's status and social ranking continues to be determined by the caste system. In the analysis the ethnic group is classified into 15 largest groups.

The child's characteristics, such as age, are essential in the model, since activeness and productivity tends to increase with age. As the child gets older the relative cost of schooling goes up, since he or she becomes increasingly productive in the work place. The ages are represented dichotomously in classes[28]. The birth order is classified to firstborns, secondborns and fourthborns or more[29], since in NLSS 2 the firstborns tend to be the most active. The family size is important in determining whether the child works, since big families may have multiple adult wage earners living under the same roof. The child's gender is playing an important role in working and schooling decisions in Nepal, since traditionally males receive the bulk of investments. Information on migration is included in the model, since moving from one district to another may improve working conditions.

2.1. Descriptive statistics

Table 1 presents the descriptive statistics of the data. The incidence of child labour in the sample is 31 per cent. 13 per cent the children only work. The overall gender distribution of working children is balanced (*works remotely* variable in table 2), but working males often attend school simultaneously, whereas working females do not (table 3). Females have a higher incidence of exclusive work and housework than males in both age categories, as 50 per cent of females between 10 to 14 years carry out housework (table 8). Children tend to work more when the mother works (table 5). The girls in particular work almost the double. On average 10 per cent of the children are idle. When the mother receives labour income, fathers seem to be working less and family size tends to be smaller by one child. Table 4 presents a graph of school enrolment ratios by age. The highest rate, 83 per cent, is for 10-year-olds. It decreases by age and already one fourth of 14-year-olds has dropped out of school. School participation rate in the total sample is 76 per cent. A child in a small family

[27] There are dozens of different ethnic groups and over 120 spoken languages in Nepal (Gordon, 2005).
[28] 6 years is the reference category
[29] Third born is the reference category

usually attends school more often than a child in a big one. Child labour increases significantly with age, since 10-14 year-olds work three times more often than 5-9 year-olds. Rural and poor areas have a clearly higher incidence of child labour than urban and richer areas. Children in rural contexts attend school far less often. Only 52 per cent attend school in rural areas. Nearly 82 per cent of urban children attend school and in the capital city the figure is already 93 per cent. A small family size is related with more schooling and clearly less exclusive working. Table 7 shows that in average children attend school more often in families that are self employed in Nepal. The percentage of children involved in exclusive child labour is over seven times higher for children in the poorest consumption quintile. The average number of labour hours in an average week among working children is 11 hours. One fourth of child labourers work for over 20 hours a week on average. Poverty, measured with the consumption quintile and adequacy of food, is central in driving children to work. Child labour decreases and schooling increases while moving up from one consumption quintile to another. In the richest quintile 80 per cent of the children (age of 5 to 14 years) attend school. In Nepal the majority of the child labour takes place in the agriculture, mostly as unpaid family workers (NLSS 2003/2004; CDPS, 1997). Other major sectors employing children are the service, communication and transportation sectors (CDPS, 1997).

3. Bivariate probit model

The connection between children's time allocation and relative female power is studied with the following econometric model. This essay does not go through the formal intra-household game theory, which can be reviewed e.g. in Lundberg and Pollak (1994) and Hoddinott et al. (1993). A bivariate probit model tries to encompass the factors that influence the probability of child's school attendance and working in a reduced form model (the presentation follows Canagarajah and Coulombe, 1998). Schooling and working decisions are assumed interdependent. They are not assumed to solely follow a sequential choice process. Therefore, a bivariate probit model is used to test the likelihood of child labour and school attendance, with individual and household characteristics. It allows the existence of correlated disturbances between the two probit equations and enables analysing whether this joint estimation makes a significant difference in regard to two univariate probit models. The model uses two binary dependent variables; whether child attends school and or works. In this essay the child labour is regarded as remunerative or non-remunerative work, excluding all household work. School attendance is defined dichotomously as 1, if the child attends

school. It is an input of child's participation to education, but as such, it does not reveal how many hours a day child spends at school. Therefore it may co-exist with child labour. Child labour, which is as well a dichotomous variable, gets a value one if the child has worked in the past[30].

Briefly, y^*_1 represents the decision of child work[31] and y^*_2 the decision of attending school. The general definition of the model is:

$y^*_1 = \beta'_1 X_1 + \varepsilon_1$, $\quad y_1 = 1$ if $y^*_1 > 0$, 0 otherwise

$y^*_2 = \beta'_2 X_2 + \varepsilon_2$, $\quad y_2 = 1$ if $y^*_2 > 0$, 0 otherwise,

$E[\varepsilon_1] = E[\varepsilon_2] = 0$, $\quad Var[\varepsilon_1] = Var[\varepsilon_2] = 1$, $\quad Cov[\varepsilon_1, \varepsilon_2] = \rho$.

The likelihood function for maximization:

$$L = \prod \int_{-\infty}^{\beta'_1 X_1} \int_{-\infty}^{\beta'_1 X_1} \Phi_2(z_1, z_2 ; \rho)\, dz_2\, dz_1,$$

where Φ_2, the bivariate normal density function is:

$$\Phi_2(z_1, z_2 ; \rho) = [2\pi(1-\rho^2)^{1/2}]^{-1} \exp[-1/2\,(1-\rho^2)^{-1}\,(z_1^2+z_2^2 - 2\rho z_1 z_2)],$$

ρ is a coefficient of correlation between the error terms in the two equations. β_1 and β_2 are the parameter column vectors (in transpose). X_1 and X_2 are column vectors of exogenous variables which determine respectively, working and schooling propensities. The variables in the vectors X_1 and X_2 are shown in the first column in the table 10. To avoid the correlation issues between parents' status variables testing was done one at a time by removing the equivalent father's variable (table 10) and plugging in mother's variable (table 11). Thus the father's estimates can be compared with mother's estimates since all else is equal.

[30] A univariate tobit model for a dependent variable of *child labour hours* was tested as well to see whether the cumulative sum of child labour hours during the preceding 12 months gives different results than the dichotomous variable in the bivariate probit model. It showed that the tobit-model results are in line with the bivariate probit.

[31] All economic work of children aged 5-14 (except housework) is taken into account when coding the second dependent variable. Thus, a distinction between the forms of child work; child labour (prevents school attendance) and child work (allows simultaneous school attendance), is not made.

4. Results

Tables 10-13 present the results from bivariate probit analyses for the total, male and female samples[32]. Tables 10 and 11 show that the age is a considerable factor in defining child's time use. Albeit school starts normally by the age of 6, 56 per cent of the children attend preschool in NLSS 2. Children tend to quit school when they get older very likely because they are increasingly needed as wage earners. Accordingly, the results in table 10 show first a rise and then a drop in school attendance by age. Working shows an increasing path by age. The birth order and working are linked, since the firstborns have a significant positive sign for the estimate upon working, suggesting that they are very likely sent to work before their younger siblings.

A key variable, remittances accrued to mothers show a negative sign upon child labour, suggesting that non-labour income that is allocated to the mother has a considerable effect on child labour. Father's remittances on the other hand seem to have an opposite effect on child labour (positive sign). Nevertheless, fathers' remittances have a positive sign upon children's school attendance. The nature of the remittances may differ when accruing to the fathers than to the mothers, but this shows that the effect of income on child labour is clearly different depending on the recipient. The estimates show that parents' work burden has an increasing effect on child labour and an opposite effect upon schooling. The estimate for mother's labour hours (table 11) has a positive significant sign upon child labour, whereas the corresponding figure for father is negative (but significant only at 15% significance level), suggesting that when the mother works children work more likely as well. This may be an implication of a low maternal bargaining power. Father's work burden has a significant negative sign upon children's education, suggesting that father's labour burden affects children's school attendance negatively. Poverty and the area may be linked with parents who work a lot, which may imply that these families cannot afford to send their children to school, but instead they have to send children to work. Estimates show that both parents' schooling affects child labour negatively and children's school attendance positively. Father's estimates are slightly more significant. This possibly suggests that decreasing the inter-spousal education gap does not increase wife's bargaining power in deciding over children's time use, since educated fathers possibly appreciate children's schooling as much. Mother's awareness of birth control issues has a positive estimate for children's schooling.

[32]The number of iterations that the SAS achieved to run in the bivariate probit model is less than 200 due to the total number of variables (51). The probit model was tested as well with a smaller number of variables. The analysis received parallel results.

This is in line with the hypothesis; these mothers may have more bargaining power and thus children are sent to work less often. The estimates show that mother's marriage age has a negative effect on child labour. This implies that women who have tied the knot later may have more bargaining power in the family and thus children are sent off to work less often. However many issues are connected to later marriage age that improve mother status, such as usually they have a higher level of completed studies and a smaller family size. Father's unemployment affects children's schooling negatively, which very likely implies that families with unemployed household head cannot afford sending children to school. The table 12 shows that father's unemployment affects female child labour negatively, which is in line with the evidence from Brazil (Parikh and Sadoulet, 2005). The inter-spousal age difference has a positive sign for the estimate upon studying and negative sign for working, suggesting that the age difference does not increase child labour. Furthermore father's age has a negative estimate upon child labour (table 11 second column on the left), suggesting that the older the father the less the child works. In Nepal the age difference is not striking, but there are clear ethnicity related differences (Casterline et al. 1986).

The negative signs of the bivariate probit-model estimates suggest that when the family is self-employed, children attend school less likely. In these families children are more likely needed as a work force[33]. The estimates show that when the family owns their house (a proxy for wealth) children attend school more probably and work less. Piped water (this affects the amount of housework and is a sign of wealth) has a positive sign for the schooling estimate, suggesting that families that have piped water are wealthier and can afford to send children to school. Not having a toilet has a negative sign for the schooling estimate and a positive sign for working. The estimates show that hunger affects both schooling and working negatively. Household size affects working negatively according to the estimates, which suggests that big families can afford to send more of their offspring to school, due to multiple wage earners (e.g. extended households). As expected, child labour is more visible in rural households. The distance to school decreases school attendance. The ethnic group affects child labour and schooling. Higher castes such as Brahman, Magar, Tharu and Newar educate their children more likely, whereas Tamangs and Muslims do not. Child labour is more probable among Chhetri, Magar, Kami and Tamang. Muslim children are less active as their parents send them to work or school less often than other ethnic groups.

[33] In the table 7 is shown that on average children in self-employed families attend school more often than children in non-self employed families. The reason for the difference in the bivariate probit-model and in the averages produced by cross tabulation is that the model controls all other factors such as family wealth (self-employed families are e.g. in average 2.5 times wealthier, which affects school attendance positively).

Child's gender clearly affects schooling and working. The estimates in table 12 show that males are more often sent to school, whereas girls are working in or outside the household. Mother's remittances affect male labour differently than female labour. The estimates show that male children work less often than female children if mother receives remittances, which is a sign of a male preference. Very likely young mothers favour male children, because the male offspring has an important role in the Nepalese culture in performing rituals and inheriting family properties etc. (Leone et al. 2003). Male child is often mother's most important asset in bargaining for old age benefits (Karki, 1988). Father's remittances have an opposite sign for the estimate, suggesting an increase in male child labour. This may be explained by possible differences in the nature of the remittances to men and women. Mother's labour income (table 13) has a positive sign upon male child labour, which most likely is suggesting that mothers and sons work because the family is poor[34]. In this case also the mother very likely has a lower bargaining power which affects her status in the bargaining process of sending boys to work or not[35]. Mother's marriage age has an effect of decreasing female child labour, which possibly suggests that, older mothers have more bargaining power, have already produced sons and can start favouring daughters and may thus send girls to work less often. According to the estimates self-employed families send boys to school clearly less often than families that are not self-employed. The house sale value seems to have a bigger effect on female children's schooling, possibly suggesting that families start educating girls only when the income is sufficient enough. The distance to a water source affects female child labour positively, suggesting that when the water source is further away girls need to work more often than boys. The distance to a school has a negative impact on female children's school attendance, which again is a sign of male preference in the society.

[34] Over 3.26 times poorer measured with average house sale values

[35] The bargaining power of the working mothers was lower compared with non-working mothers in NLSS 2 measured with indicators such as education, marriage age and remittances.

5. Conclusion

The previous research has devoted some attention to examining the effect of mother's intra-family status on child labour. This essay uses data from the Nepal Living Standards Survey 2 to analyse whether children use their time differently in a situation where the mother has a say in the intra-household decision-making process. The relation was studied with a bivariate probit model with a set of bargaining power indicators. The results show that the non-labour income (remittances) has a reverse impact depending on the receiver. Moreover the mother's remittances have an effect of decreasing child labour, whereas the father's remittances do the opposite, suggesting that the non-labour income in the hands of a woman decreases child labour more than in the hands of a man. Rising the mother's marriage age has an effect of decreasing child labour. The mother's birth controlling awareness affects the propensity to send children to school positively. The parents' education affects significantly children's school attendance and working. The impact is almost equal for the father and the mother, suggesting that decreasing the inter-spousal education gap does influence children's time use significantly. The distance to a water source has an effect of increasing female child labour and the distance to a school affects especially girls' school attendance negatively. Moreover females have higher probabilities to leave school when the relative cost of education rises. The fees on education, as well as discrimination in families should be eliminated to increase poor children's, especially females' welfare in Nepal. This study brought evidence to the hypothesis that improving the balance of power in a household decreases child labour and enhances their school attendance, which contributes in stopping the transmission of child labour to the next generation.

References

Basu K. and Van P. H. 1998: *The Economics of Child Labor*. The American Economic Review.

Basu, K., Horn, H., Román, L. and Shapiro, J. 2003: *International Labour Standards*. Ch. 3. Blackwell Publishing Ltd.

Basu, K. 2004: *Gender and Say*. Harvard Institute of Economic Research, Discussion Paper Number 2054.

Becker, G. 1964 (1993 3rd edition): *Human Capital Theoretical and Empirical Analysis, with Special Reference to Education*. Chicago, University of Chicago Press.

Beegle, K., Dehejia, R. and Gatti, R. 2005: *Why Should We Care About Child Labour? The Education, Labor Market, and Health Consequances of Child Labor*. The World Bank Policy Research Working Paper No. 3479.

Browning, B., F., Bourguignon F., P., Chiappori and Lechene V. 1994: *Income and Outcomes: a Structural Model of Intrahousehold Allocation*", Journal of Political Economy, 102, 1067-1096.

Canagarajah, S. and Coulombe, H. 1997: *Child Labour and Schooling in Ghana*. The World Bank, Human Development Technical Family. Policy Research Working Paper No. 1844.

Casterline, J., Williams, L. and McDonald, P. 1986: *The Age Difference Between Spouses: Variations among Developing Countries*. Population Studies, 40, 353-374.

Chiappori, P.A. and Oreffice, S. 2007: *Birth Control and Female Empowerment: An Equilibrium Analysis.*

Cigno,A., Rosati, F.C. and Tzannatos, Z. 2001: *Child Labor, Nutrition and Education in Rural India: An Economic Analysis of Parental Choice and Policy Options Social Protection.* World Bank Discussion Paper No. 0131.

CDPS, Central Department of Population Studies. 1997: *Child labour situation in Nepal. Report from Migration and Employment Survey (1995/96)*, Tribhuwan University and ILO.

Dasgupta, P and Goldar, B. 2005: *Female Labour Supply in Rural India: An Econometric Analysis*. Institute of Economic Growth, Delhi University Enclave.

Duflo, E. 2005: *Gender Equality in Development.* Massachusetts Institute of Technology.

Gilligan, B. 2003: *An Analysis of the Determinants of Child Labour in Nepal, the Policy Environment and Response*. Understanding Children's Work. An Inter-Agency Research Cooperation Project. UCW Publications.

Gordon, R. G. Jr. 2005: *Ethnologue: Languages of the World.* SIL International.

Grootaert, C. 1998: *Child Labor in Côte d'Ivoire: Incidence and Determinants.* World Bank Policy Research Working Paper No. 569204.

Hoddinott, J, Alderman, H. and Haddad, L. 1993: *Household Models and Intrahousehold esource Allocation.* Intrahousehold resource allocation in developing countries: Methods, models, and policy. Mimeo, IFPRI-World Bank.

ILO-IPEC: *Child Labour Situation in Nepal, 1996.* The World Bank.

Jejeebhoy, S. 1995: *Women's education, autonomy, and reproductive behavior: Experience from developing countries.* Oxford, England: Clarendon Press.

Karki, Y. 1988: *Sex Preference and the Value of Sons and Daughters in Nepal.* Studies in Family Planning, Vol. 19, No. 3. (May - Jun., 1988), pp. 169-178.

Leone, T., Matthews, Z. and Dalla Zuanna, G. 2003: *Impact and Determinants of Sex Preference in Nepal. International Family Planning Perspectives.* Volume 29, Number 2.

Lundberg, S. and Pollak, S. 1994: *Alternative Perspectives on Distribution Within Marriage - Noncooperative Bargaining Models of Marriage.* The American Economic Review, Vol. 84, No. 2, Papers and Proceedings of the Hundred and Sixth Annual Meeting of the American Economic Association. (May, 1994), pp. 132-137.

Parikh, A. and Sadoulet, E. 2005: *The Effect of Parents' Occupation on Child Labor and School Attendance in Brazil.* Working Paper - Department of Agricultural and Resource Economics and Policy, Division of Agriculture and Natural Resources, University of California, (No. 1000).

Quisumbing, A. and Hallman, K. 2006: *Marriage in Transition: Evidence on Age, Education, and Assets from Six Developing Countries.* In *The Changing Transitions to Adulthood in Developing Countries.* Ch. 7, pp.200-269. The National Academies Press. Washington, D.C. http://books.nap.edu/openbook.php?record_id=11524&page=200

Rosati, F. and Deb, P. 2004: *Determinants of Child Labor and School Attendance: The Role of Household Unobservables.* Hunter CUNY research papers. http://arrow.hunter.cuny.edu/research/papers/HunterEconWP02-9.pdf

Udry, C. 1996: *Gender, Agricultural Production, and the Theory of the Household* The Journal of Political Economy, Vol. 104, No. 5, pp. 1010-1046.

UIS: UNESCO Institute for Statistics/ Predefined public tables/ Education. (1.11.2007).

UNESCO 2006: *Education – The Price of School Fees.* http://portal.unesco.org/ (30.10.2007)

UNICEF: http://www.unicef.org/protection/index_childlabour.html (30.10.2007)

US Department of Labor, 1998: *By the Sweat and Toil of the Children, Efforts to Eliminate Child Labor.* Vol 5.

Wahba, J. 2000: *Do Market Wages Influence Child Labor and Child Schooling?* World Bank Social Protection Discussion Paper No. 0024

Appendix

Table 1 Summary statistics

Variable	Mean	Std.Dev.	Min.	Mx.	NOB
Child-level variables					
Age of the child	9.20	2.81	5	14	4473
Birth order of the child	2.86	1.82	1	11	4473
Gender (male=1)	0.51	0.50	0	1	4473
Student	0.76	0.43	0	1	4473
Idle	0.10	0.30	0	1	4473
Only works	0.13	0.34	0	1	4473
Chores and remote work	0.40	0.49	0	1	4473
Works and studies	0.26	0.44	0	1	4473
Chores	0.18	0.39	0	1	4473
Remote work	0.31	0.46	0	1	4473
Total child labour hours last 12 months	278.75	573.20	0	5760	4473
Average child labour hours last week	7.25	14.04	0	112	4473
Total chore hours last 12 months	93.65	283.68	0	2880	4473
Total chore hours last week	2.18	6.44	0	70	4473
Child has migrated	0.07	0.26	0	1	4473
Interspousal differences					
Labour income differential	0.31	0.41	0	1	3109
Education differential	2.72	3.73	-11	15	4433
Age differential	4.65	4.76	-30	32	4059
Working hour differential (mother/father)*	0.83	1.97	0.00	99.50	3655
Mother's characteristics					
Mother can write	0.28	0.45	0	1	4473
Mother's education	1.64	3.32	0	15	4473
Mother is unemployed	0.13	0.34	0	1	4473
Mother has migrated	0.78	0.41	0	1	4473
Mother's remittances	6080.76	32378.80	0	900000	4473
Mother's age	34.31	6.37	20	49	4473
Mother is chronically ill	0.06	0.24	0	1	4473
Mother's age at marriage	16.82	3.20	5	35	4458
Mother is aware of birth control	0.77	0.42	0	1	4458
Mother's burden of chores (hours 12 ms)	1058.98	587.26	0	4320	4473
Mother's labour income	3542.86	24425.98	0	1438400	4473
Mother's total work hours 12 months	2713.49	1079.76	0	8102	4473
Father's characteristics					
Father's total work hours 12 months	2360.41	953.97	0	6510	3695
Father lives in the household	0.83	0.37	0	1	4472
Father's education	4.35	4.49	0	18	4433
Father can write	0.64	0.48	0	1	3690
Father is unemployed	0.12	0.33	0	1	4473
Father has migrated	0.34	0.48	0	1	3692
Father's remittances	1638.78	10538.75	0	250000	4473
Father's age	39.16	7.93	5	69	4059
Father's labour income	24930.44	315096.28	0	20800000	4473
Household level variables					
hhsize	6.76	3.11	2	32	4473
Self employment	0.28	0.45	0	1	4472
Family owns the house	0.92	0.27	0	1	4473
House sale value in 100 000 Rs.	2.75	7.86	0.01	20	4118
Piped water dummy	0.16	0.37	0	1	4473
No toilet	0.61	0.49	0	1	4473
Education is not adequate	0.27	0.44	0	1	4227
Family has experienced hunger lately	0.26	0.44	0	1	4473
Rural household	0.77	0.42	0	1	4473
Water situation is bad	0.24	0.43	0	1	3363

Ethnicity					
Cchetri	0.15	0.36	0	1	4473
Brahman (hill)	0.13	0.34	0	1	4473
Magar	0.06	0.24	0	1	4473
Tharu	0.07	0.25	0	1	4473
Tamang	0.07	0.25	0	1	4473
Newar	0.08	0.27	0	1	4473
Muslim	0.07	0.25	0	1	4473
Kami	0.04	0.19	0	1	4473
Yadav	0.03	0.16	0	1	4473
Rai	0.03	0.18	0	1	4473
Gurung	0.02	0.15	0	1	4473
Damain Dholi	0.02	0.15	0	1	4473
Limbu	0.01	0.11	0	1	4473
Thakuri	0.02	0.13	0	1	4473
Sarki	0.02	0.13	0	1	4473
Teli	0.01	0.12	0	1	4473
Chamar/Harijan/Ram	0.01	0.12	0	1	4473
Dhanuk	0.02	0.12	0	1	4473
Mallah	0.01	0.12	0	1	4473
Other ethnicity group	0.13	0.34	0	1	4473
Distances in minutes					
School	17.39	26.55	0	1200	4473
Health post	48.47	67.64	0	1440	4473
Buss stop	347.68	1115.47	0	12960	4473
Dirt road	282.25	1046.37	0	12960	4473
Shops	43.97	297.44	0	8640	4473
Bazaar	30.88	132.48	0	2880	4473
Market	208.00	633.49	0	14400	4473
Water source	4.14	36.95	0	1440	4473
Post office	58.25	135.18	0	2880	4473

* excludes household work

Table 2 Summary statistics on selected variables by gender

	Males		Females	
Variable	**Mean**	**Std Dev**	**Mean**	**Std Dev**
Child's characteristics				
Child's age	9.24	2.78	9.15	2.84
Birth order	2.85	1.85	2.88	1.79
Student	0.81	0.39	0.71	0.45
Idle	0.10	0.30	0.11	0.31
Only works	0.09	0.28	0.18	0.39
Works in the hh and remotely	0.34	0.47	0.46	0.50
Works and studies	0.25	0.43	0.28	0.45
Does chores	0.05	0.22	0.32	0.47
Works remotely	0.31	0.46	0.32	0.47
Total child labour hours	189.77	441.06	372.26	672.68
Remote work days a week	1.68	3.23	3.36	4.97
Remote hours a day	1.11	2.21	1.93	3.18
Remote work hours last week	5.07	11.16	9.55	16.23
Total chore hours last 12 months	19.85	127.90	171.20	368.98
Chore days a week	0.19	1.06	1.58	2.74
Chore hours a day	0.09	0.50	0.71	1.34
Total chore hours a week	0.47	2.99	3.98	8.32
Migrated	0.07	0.26	0.07	0.26
Status variables				
Age differential	4.71	4.67	4.60	4.86
Mother's income as a fraction of parental income	0.31	0.41	0.30	0.40
Education differential	2.64	3.71	2.80	3.74
Mother's characteristics				
Household chores a year	1064.23	578.71	1053.47	596.21
Can write	0.29	0.46	0.27	0.45
Education level	1.68	3.37	1.59	3.27
Unemployed	0.13	0.34	0.12	0.33
Migrated	0.78	0.41	0.78	0.41
Remittances	6116.25	32173.90	6043.46	32600.08
Age	34.40	6.48	34.22	6.25
Yearly labour income	3731.53	32040.75	3344.58	12039.53
Father's characteristics				
Lives at home	0.83	0.37	0.83	0.37
Can write	0.63	0.48	0.65	0.48
Education level	4.32	4.47	4.39	4.50
Unemployed	0.13	0.33	0.11	0.32
Migrated	0.34	0.47	0.35	0.48
Remittances	1834.29	12074.88	1433.31	8632.94
Age	39.31	7.95	39.00	7.90
Yearly labour income	28676.23	437350.98	20994.01	51252.70
Sample size	2292		2181	

Table 3 Distribution of children by economic activity status.

	School only	School & Work	Work only	Not active	Total
Age group					
5-9	64.8	8.4	5.4	21.4	100
10-14	45.2	33.5	16.6	4.7	100
Gender					
Male	59.3	22.7	7.5	10.4	100
Female	51.1	18.3	14.2	16.4	100
Development region					
East	55.6	19.6	11.3	13.5	100
Central	50.5	18.2	14.3	17	100
West	66.4	22.4	3.9	7.2	100
Mid West	53.6	22.5	11	12.9	100
Far West	50.9	26.4	10.6	12.2	100
Ecological Zone					
Mountains	44.2	32	10.3	13.5	100
Hills	55.3	25.1	10.1	9.6	100
Terai	56.8	15.3	11.5	16.5	100
Urban	81.9	8.4	4	5.7	100
Kath. Valley	92.7	3	2	2.3	100
Other	77.3	10.6	4.9	7.2	100
Rural	51.7	22.2	11.7	14.4	100
East Mts./Hills	41.5	30.7	13.7	14.2	100
West Mts./Hills	56.3	26.5	9	8.1	100
East Terai	51.8	12.9	15.5	19.8	100
West Terai	59.2	22.2	5.8	12.8	100
Consumption Quintile					
Poorest	38.7	13.4	20.5	27.3	100
Second	48	23.2	11.4	17.5	100
Third	57.5	24.5	9.7	8.2	100
Fourth	62.2	26.6	5.7	5.5	100
Richest	80	15	2.7	2.3	100
Nepal	55.3	20.6	10.8	13.3	100

Table 4 School enrolment ratios in each age group

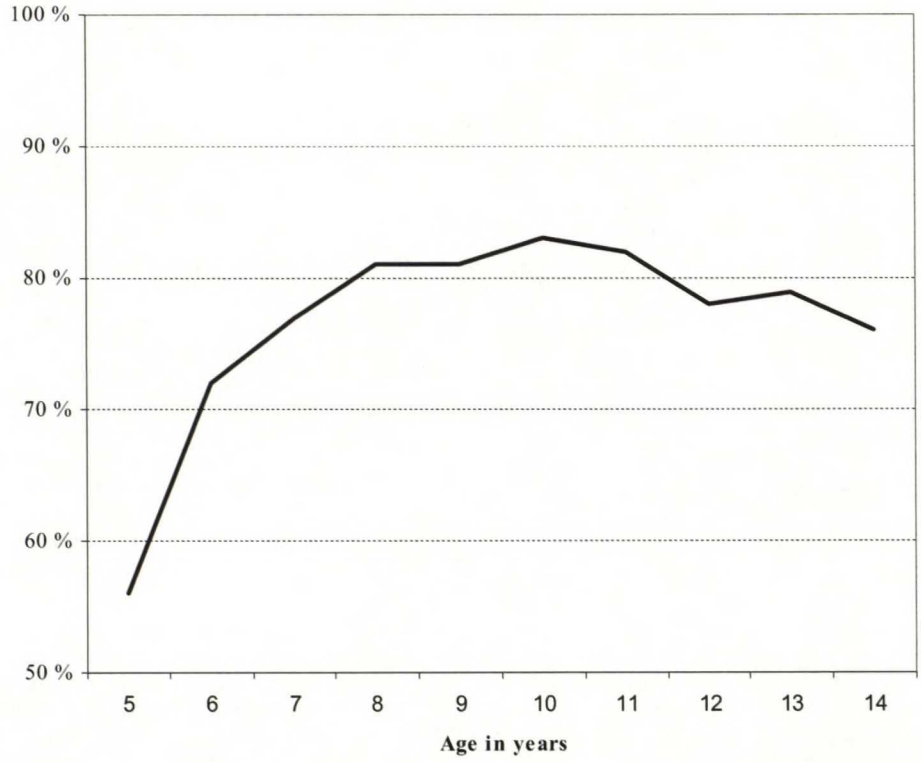


Table 5 Mother's labour income status and children's activities (aged 5-14)

		Mother does not receive labour income	Mother receives labour income
No. Of Obs.		3330	1143
Family size		7.0	6.1
Working time of fathers (hours in 12 months)		2384.7	2285.3
Children aged 5-14			
Goes to school(1=yes)	male	0.83	0.76
	female	0.75	0.59
Is idle(1=yes)	male	0.08	0.14
	female	0.10	0.14
Only works (1=yes)	male	0.08	0.10
	female	0.15	0.28
Does chores and works remotely (1=yes)	male	0.33	0.35
	female	0.44	0.53
Works and studies (1=yes)	male	0.25	0.24
	female	0.29	0.25
Does household chores (1=yes)	male	0.05	0.06
	female	0.29	0.42
Works remotely (1=yes)	male	0.31	0.31
	female	0.31	0.35
All work during last 12 months (hours)	male	185.4	202.9
	female	325.7	504.7
Total chores during last 12 months (hours)	male	18.1	24.9
	female	141.3	256.3

Table 6 Children's time use by birth order and family size (NLSS 2)

	NOB	Student	Only works	Work and study	HH chores	Idle
NOB		3411	603	1786	813	459
Birth order		2.78	2.9	2.87	2.62	3.4
Family size		6.59	7.18	6.6	6.51	7.5
By birth order						
Fisrt born	1722	0.80	0.13	0.27	0.22	0.07
Second born	1090	0.78	0.13	0.25	0.18	0.09
Third born	815	0.74	0.15	0.25	0.19	0.11
Fourth born	578	0.74	0.13	0.29	0.17	0.12
Fifth born or more	768	0.71	0.14	0.27	0.13	0.15
By family size						
4 or less	770	0.86	0.08	0.27	0.16	0.06
From 5-6	1826	0.78	0.13	0.3	0.2	0.09
From 7-8	1052	0.69	0.18	0.24	0.19	0.13
Over 9	825	0.72	0.14	0.21	0.14	0.13

Table 7 Self-employment and children's time use

	Household self employed (in agriculture or other)	
Children's time use	**Yes**	**No**
Attends school	0.79	0.75
Is idle	0.09	0.11
Only works	0.12	0.14
Works in hh or out	0.35	0.42
Works and studies	0.23	0.28
Does household chores	0.16	0.19
Other work than hh chores	0.27	0.33

Table 8 Time use of children by gender

	Aged 5-9			Aged 10-14		
	Boys	Girls	Total	Boys	Girls	Total
No. Of Obs.	1202	1210	2412	1090	971	2061
Is a student (1=yes)	0.78	0.68	0.73	0.85	0.74	0.80
Is idle (1=yes)	0.17	0.19	0.18	0.02	0.01	0.01
Only works (1=yes)	0.05	0.13	0.09	0.13	0.25	0.19
Does chores and works remotely (1=yes)	0.16	0.27	0.21	0.54	0.71	0.62
Works and studies (1=yes)	0.11	0.14	0.12	0.40	0.46	0.43
Does household chores (1=yes)	0.03	0.17	0.10	0.07	0.50	0.28
Works remotely (1=yes)	0.13	0.16	0.14	0.51	0.52	0.51
All work during last 12 months (hours)	82.3	185.3	134.0	308.2	605.2	448.2
Total chores during last 12 months (hours)	15.0	97.4	56.3	25.2	263.1	137.2

Table 9 Characteristics of the sample households by their hunger status

	No hunger	Hunger
No. Of Obs.	3301	1172
Age of the father	39.1	39.3
Age of the mother	34.3	34.1
Education of the father (years)	4.9	2.9
Education of the mother (years)	1.9	0.8
Household size	6.9	6.4
Value of the house Rs.	333 698	110 520

Table 10 Bivariate probit analysis

	Studies				Works			
Variable	Estimate	Std Error	t Value	Approx Pr > |t|	Estimate	Std Error	t Value	Approx Pr > |t|
Child's characteristics								
5 years old	-0.82	0.11	-7.46	***	-1.07	0.16	-6.62	***
7 years old	0.15	0.11	1.30		-0.37	0.12	-3.06	***
8 years old	0.28	0.11	2.43	**	0.08	0.11	0.76	
9 years old	0.30	0.12	2.52	**	0.32	0.11	2.80	***
10 years old	0.47	0.12	4.05	***	0.60	0.11	5.66	***
11 years old	0.34	0.13	2.65	***	0.70	0.12	6.08	***
12 years old	0.19	0.11	1.72	*	1.16	0.11	10.80	***
13 years old	-0.08	0.12	-0.61		1.13	0.12	9.74	***
14 years old	0.06	0.13	0.48		1.47	0.12	12.20	***
Firstborn	-0.08	0.08	-0.96		0.20	0.08	2.54	**
Secondborn	0.02	0.08	0.21		0.06	0.08	0.72	
Fourth born or over	0.06	0.08	0.79		-0.10	0.07	-1.37	
Is male	0.54	0.05	9.88	***	-0.14	0.05	-2.74	***
Child migrated	0.16	0.18	0.91		0.05	0.14	0.39	
Key variables								
Remittances in 1000 Rs to	0.00	0.00	0.27		-0.01	0.00	-1.90	*
Remittances in 1000 Rs to	0.00	0.00	1.77	*	0.00	0.00	1.77	*
Fathers labour income	0.00	0.00	-0.11		0.00	0.00	0.53	
Fathers labour in 1000 hrs	-0.09	0.03	-2.77	***	-0.04	0.03	-1.42	
Father's education attainment	0.06	0.01	7.94	***	-0.04	0.01	-6.28	***
Interspousal age difference	0.01	0.01	2.17	**	-0.01	0.01	-2.65	***
Birthcontrol aware mother	0.51	0.06	8.35	***	-0.03	0.06	-0.47	
Mother's marriage age	0.01	0.01	1.18		-0.03	0.01	-2.92	***
Parent's characteristics								
Father migrated	-0.04	0.07	-0.67		-0.08	0.06	-1.24	
Mother migrated	-0.04	0.07	-0.56		0.04	0.06	0.69	
Mother is unemployed	-0.13	0.09	-1.46		-0.10	0.08	-1.14	
Father is unemployed	-0.14	0.08	-1.89	*	-0.05	0.08	-0.64	
Mother chronically ill	0.12	0.12	1.06		0.05	0.10	0.50	
Other characteristics								
HH is self employed	-0.12	0.06	-1.91	*	-0.09	0.06	-1.57	
House sale value in 1000 Rs	0.00	0.00	3.54	***	0.00	0.00	-5.75	***
HH has piped water	0.19	0.12	1.65	*	-0.02	0.09	-0.19	
No toilet	-0.61	0.08	-7.81	***	0.11	0.07	1.64	
Hunger	-0.15	0.06	-2.53	**	-0.13	0.06	-2.09	**
Household size	-0.01	0.01	-1.26		-0.04	0.01	-4.01	***
Cchetri	0.05	0.10	0.53		0.23	0.09	2.54	**
Brahman (hill)	0.42	0.12	3.49	***	-0.02	0.10	-0.21	
Magar	0.27	0.14	2.00	**	0.25	0.12	2.04	**
Tharu	0.24	0.12	2.07	**	0.05	0.11	0.44	
Tamang	-0.29	0.11	-2.69	***	0.25	0.11	2.20	**
Newar	0.26	0.15	1.66	*	0.12	0.13	0.93	
Muslim	-0.26	0.11	-2.35	**	-0.34	0.12	-2.84	***
Kami	0.16	0.15	1.09		0.26	0.15	1.77	*
Yadav	-0.13	0.16	-0.80		0.17	0.17	0.98	
Rai	0.17	0.16	1.09		0.21	0.16	1.32	
Gurung	0.30	0.23	1.28		0.00	0.21	-0.01	
Damain/Dholi	0.28	0.19	1.49		0.11	0.18	0.61	
Sarki	0.12	0.21	0.56		0.14	0.20	0.67	
Thakuri	0.33	0.28	1.20		0.08	0.20	0.38	
Dhanuk	-0.15	0.21	-0.72		0.12	0.20	0.59	
Rural household	-0.14	0.09	-1.55		0.37	0.08	4.50	***
Distance to water	0.00	0.00	-0.50		0.00	0.00	0.50	
Distance to school	0.00	0.00	-2.73	***	0.00	0.00	1.23	
Intercept	0.27	0.27	1.01		-0.01	0.25	-0.06	

Table 11 Estimates for variables tested one by one in the above bivariate probit model (previous table)

	Studies				Works			
Key variable tested separtely in the bivariate model (previous table)	Estimate	Std Error	t Value	Approx Pr > |t|	Estimate	Std Error	t Value	Approx Pr > |t|
Mother's labour income instead of father's labour income	0.00	0.00	0.23		0.00	0.00	1.29	
Mother's labour in 1000 hrs instead of father's labour	-0.05	0.03	-1.45		0.17	0.03	5.73	***
Mother's education attainment instead of father's education	0.08	0.02	4.99	***	-0.07	0.01	-5.71	***
Mother's age instead of age differential	-0.01	0.01	-1.20		0.01	0.01	2.35	**
Father's age instead of age differential	0.00	0.00	-0.04		-0.01	0.00	-1.90	*

Table 15 Bivariate probit results: male and female samples

	Males						Females					
	studies			works			studies			works		
Variable	Coeff	t Value	Pr>|t|	Coeff	t Value	Pr>|t|	Coeff	t Value	Pr>|t|	Coeff	t Value	Pr>|t|
Child's characteristics												
5 years old	-0.89	-5.59	***	-1.00	-4.34	***	-0.46	-3.02	***	-1.23	-4.05	***
7 years old	0.34	1.97	**	-0.44	-2.50	**	0.18	1.18		0.32	1.79	*
8 years old	0.25	1.51		0.07	0.45		0.42	2.56	**	0.68	3.90	***
9 years old	0.34	1.89	*	0.28	1.68	*	0.31	1.95	*	0.88	5.08	***
10 years old	0.49	2.92	***	0.61	4.12	***	0.48	2.98	***	1.11	6.60	***
11 years old	0.41	2.20	**	0.73	4.49	***	0.37	2.13	**	1.27	6.86	***
12 years old	0.29	1.77	*	1.22	8.13	***	0.21	1.28		1.67	9.60	***
13 years old	-0.04	-0.19		1.14	6.95	***	-0.01	-0.05		1.72	9.41	***
14 years old	0.13	0.72		1.47	8.53	***	0.06	0.34		2.08	11.00	***
Firstborn	-0.08	-0.63		0.28	2.54	**	-0.03	-0.29		0.04	0.36	
Secondborn	-0.02	-0.15		0.10	0.89		0.08	0.71		-0.02	-0.19	
Fourth born or over	0.06	0.56		0.00	-0.02		0.15	1.43		-0.20	-1.88	*
Child migrated	0.11	0.44		0.12	0.64		0.54	2.01	**	-0.22	-1.07	
Key variables												
Remittances in 1000 Rs to mother	0.04	1.24		-0.05	-1.95	*	0.00	-0.43		-0.01	-1.48	
Remittances in 1000 Rs to father	0.00	1.13		0.01	2.22	**	0.01	1.32		0.00	-0.03	
Fathers labour income	0.00	-0.38		0.00	0.90		0.00	0.52		0.00	0.63	
Fathers labour in 1000 hrs	-0.04	-0.80		-0.06	-1.48		-0.01	-0.29		-0.05	-1.13	
Father's education attainment	0.06	4.86	***	-0.03	-2.73	***	0.07	6.60	***	-0.06	-5.63	***
Interspousal age difference	0.01	0.86		-0.01	-1.02		0.02	2.38	**	-0.02	-1.90	*
Birthcontrol aware mother	0.61	6.96	***	-0.06	-0.73		0.45	5.23	***	0.03	0.33	
Mother's marriage age	0.01	0.67		-0.01	-0.89		0.02	1.30		-0.02	-1.66	*
Parent's characteristics												
Father migrated	-0.05	-0.54		-0.17	-1.91	*	-0.06	-0.69		0.05	0.55	
Mother migrated	0.08	0.87		-0.17	-1.95	*	-0.04	-0.43		0.18	1.94	*
Mother is unemployed	-0.13	-1.05		-0.15	-1.28		-0.13	-0.98		0.01	0.07	
Father is unemployed	-0.15	-1.36		0.12	1.10		-0.07	-0.61		-0.24	-2.12	**
Mother chronically ill	0.12	0.70		0.03	0.19		0.05	0.29		0.01	0.03	
Other characteristics												
HH is self employed	-0.23	-2.43	**	-0.11	-1.24		-0.05	-0.55		-0.06	-0.63	
House sale value in 1000 Rs	0.00	1.63		0.00	-5.15	***	0.00	4.13	***	0.00	-3.27	***
HH has piped water	0.19	1.01		-0.04	-0.29		0.21	1.34		-0.01	-0.09	
No toilet	-0.62	-5.27	***	-0.02	-0.23		-0.28	-2.67	***	0.25	2.57	**
Hunger	-0.24	-2.75	***	-0.17	-2.02	**	-0.05	-0.59		-0.13	-1.46	
Household size	-0.01	-0.36		-0.04	-2.71	***	-0.01	-1.15		-0.04	-2.97	***
Cchetri	-0.21	-1.51		0.20	1.55		0.64	4.79	***	0.29	2.13	**
Brahman (hill)	0.24	1.30		-0.03	-0.22		0.92	5.62	***	0.06	0.39	
Magar	0.12	0.60		0.34	2.00	**	0.77	4.04	***	0.35	1.90	*
Tharu	0.01	0.05		0.02	0.15		0.74	4.44	***	0.12	0.70	
Tamang	-0.48	-3.06	***	0.30	1.80	*	0.35	2.25	**	0.33	2.00	**
Newar	0.33	1.26		0.14	0.78		0.50	2.50	**	0.18	0.96	
Muslim	-0.12	-0.73		-0.44	-2.43	**	-0.07	-0.44		-0.23	-1.33	
Kami	0.00	-0.02		0.41	2.04	**	0.77	3.86	***	0.12	0.54	
Yadav	-0.07	-0.32		0.18	0.74		-0.22	-0.94		0.70	2.73	***
Rai	0.03	0.13		0.35	1.54		0.77	3.50	***	0.12	0.53	
Gurung	0.19	0.54		0.00	0.00		1.06	3.09	***	0.13	0.41	
Damain/Dholi	0.22	0.81		0.19	0.77		0.97	3.51	***	0.09	0.32	
Sarki	0.01	0.05		0.03	0.09		0.48	1.47		0.76	2.32	**
Thakuri	0.25	0.66		0.16	0.60		1.13	2.46	**	0.07	0.21	
Dhanuk	-0.10	-0.37		0.16	0.63		-0.50	-1.47		0.30	0.91	
Rural household	-0.12	-0.86		0.30	2.53	**	-0.07	-0.53		0.47	3.94	***
Distance to water	0.00	-0.19		0.00	-0.05		0.00	-0.93		0.01	1.76	*
Distance to school	0.00	-0.82		0.00	1.03		-0.01	-4.52	***	0.00	0.69	
Intercept	0.64	1.64		-0.12	-0.32		-0.79	-2.10	**	-0.90	-2.42	**

Table 13 Variables tested in the above model one by one for comparisons

	Males						Females					
	student			work			student			work		
Variable	Coeff	t Value	Pr>|t|	Coeff	t Value	Pr>|t|	Coeff	t Value	Pr>|t|	Coeff	t Value	Pr>|t|
Mother's labour income instead of father's labour income	0.00	0.37		0.00	1.75	*	0.00	-0.84		0.00	0.47	
Mother's labour in 1000 hours instead of father's labour hours	0.02	0.50		0.13	2.98	***	0.01	0.17		0.13	2.88	***
Mother's education attainment instead of father education	0.09	3.57	***	-0.05	-3.14	***	0.07	2.94	***	-0.08	-4.83	***